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NATURAL HISTORY

JOURNAL OF THE AMERICAN MUSEUM OF NATURAL HISTORY

EXPLORATION · RESEARCH · EDUCATION

EDUCATION NUMBER

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NATURAL HISTORY

THE JOURNAL OF THE AMERICAN MUSEUM

DEVOTED TO NATURAL HISTORY
EXPLORATION, AND THE DEVELOPMENT OF PUBLIC EDUCATION
THROUGH THE MUSEUM

EDUCATION NUMBER

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From a photograph by Clyde Fisher

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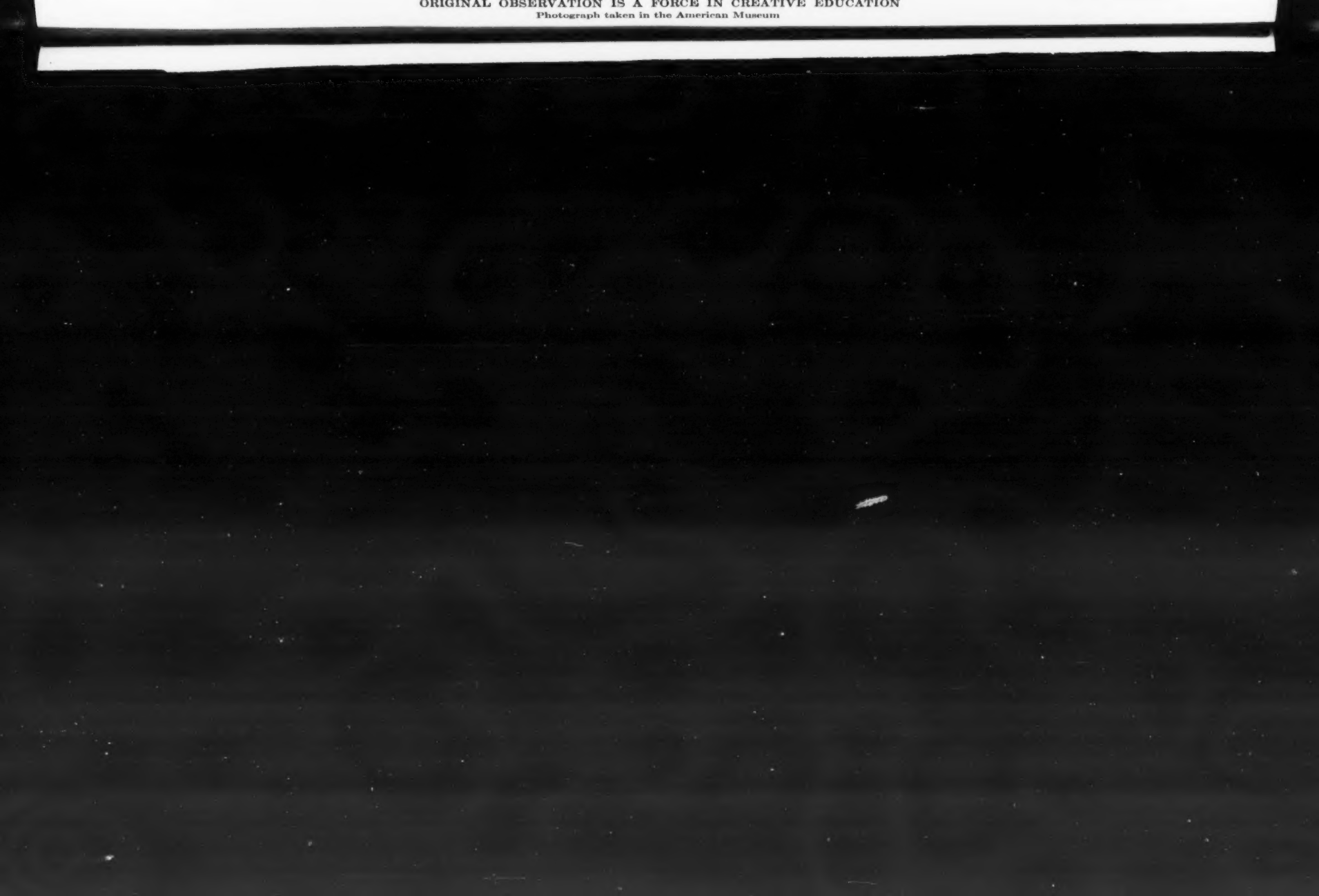
ORIGINAL OBSERVATION IS A FORCE IN CREATIVE EDUCATION
Photograph taken in the American Museum



ORIGINAL OBSERVATION IS A FORCE IN CREATIVE EDUCATION

Photograph taken in the American Museum

NATURAL HISTORY

VOLUME XXVII JULY–AUGUST, 1927 NUMBER 4

"Creative Education"[1]

BY HENRY FAIRFIELD OSBORN

President of the American Museum of Natural History

FIFTY years as a teacher have afforded an original retrospect and prospect of the art of education, an art which has an unchanging element in the quality of the human mind and an ever-changing element in the vicissitudes of our environment which we call civilization. Throughout this long half-century period I have been consistent with my oft-repeated advice to my students, namely, to think a subject out for oneself and then to read what others have thought about it. I have myself given an immense amount of personal thought to the methods of intellectual education, and I am free to confess that I have depended very little on reading even of the works of the great masters and innovators to whom I refer from time to time in this volume. My rule with myself and with my students has been, first, to try to master a subject or to thoroughly understand it; second, to try to add something of my own to this subject—that is, to produce or create something new. I have followed this productive principle successively in psychology, in neurology, in comparative anatomy, in palæontology, in biology, and, finally, in the philosophy of life. In each of these great subjects I have undertaken original research and publication and have attempted to impress upon myself and upon the talented students who sought my advice the spirit of thoroughness and then of creation or production.

REAL BASIS OF CREATIVE EDUCATION

Beginning in the autumn of 1881 as a very young and inexperienced assistant professor of comparative anatomy in the College of New Jersey (the larger title of Princeton University was not assumed until 1896), I opened my courses very much along the lines I had myself followed two years before in the laboratories of Francis Maitland Balfour at Cambridge and of Thomas Henry Huxley in London. While the technique and outline of the courses followed the general method introduced by Huxley into biological teaching, my attitude toward the students was rather that of Balfour in his splendid course in comparative anatomy, namely, a personal and more or less intimate attitude which is possible in classes of fifteen to twenty-five but impossible with the very large classes of the present college and university period. With my college students, I depended from the outset neither upon discipline nor upon the marking system, but upon the *inherent interest of the subject.* Once captivated by the interest of the subject, a student needs to be held back rather than pushed forward! I felt instinctively that original observation and original thinking by the students were far more im-

[1] NATURAL HISTORY is privileged to publish advance excerpts from Henry Fairfield Osborn's book, *Creative Education.* (Charles Scribner's Sons, New York.)

portant than any instruction or body of learning I could give them, and I began to practise creative methods of education long before I had formulated any theory or principle of education.

One of the most brain-stirring periods of my life was in my study in the American Museum of Natural History when Baca-Flor, the Peruvian portrait painter, narrated to me his search for the lost art of the ancients, as he termed the masters of painting of the fifteenth and sixteenth centuries. For fifteen years he had read all that was written and had listened to all the lectures offered in Paris, but no one told him the secret of the ancients. Finally he concluded that their art was lost and must be rediscovered. Similarly, and on my own account, in 1903[1] I came to the conclusion that something had been lost in the art of education. I looked into some of the pedagogic literature of the day; it left me entirely unsatisfied; I felt that some principle must be rediscovered. Then I began to delve into my own experience and to wonder how I got my own education. I tried to get down to the very bottom of things and settle upon solid bases, cutting out of vision all the temporal and contemporary supports. One essay which may have helped me was Ruskin's "Seven Lamps of Architecture," but it was a mere coincidence that I came to the conclusion that the solid bases of education lay not at all in what modern pedagogues, such as President McCosh of Princeton and President Eliot of Harvard, were debating, that their controversy was matter which had temporarily assumed the aspect of solidity and of real importance, and that the real basis of education was the balanced or reasonable or well-adjusted working of seven principles, or factors, or forces, or influences as intimately related as seven harmonious and beautiful sisters, so that none could be complete without the others; that every well-educated man from the very beginning had unconsciously worked out these seven principles in his own self-education and that the measure of his success and influence was the measure in which he employed them all or worked toward all, some flowing into him and some flowing out of him.[2]

What are these principles or factors which are essential to the creative and productive mind, and what educational theory is most apt to develop them?

So far as intellectual progress is concerned—and I am not now discussing religious, moral, or physical progress—the first and most fundamental of these forces are in the nature of canons, or standards: they lie in the distinction of TRUTH from error, in the appreciation of BEAUTY and fitness, and in the application of these standards to thought. Together with our standards come our sources of knowledge, and there arises, as the first, that of LEARNING from the stores of tradition, from books, and the experience of man in our own and previous generations; there follows close, as the distinctively nineteenth-century source of knowledge, that of direct OBSERVATION of men and of nature. Then, for the testing of our knowledge, there is the triumphant crucible of human REASON. Next, our standards, our knowledge, and our reason seek EXPRESSION in spoken and written language. Finally, as the supreme human, most closely approaching the

[1] Osborn: *The Mediæval and the True Modern Spirit in Education.*

[2] This seemed far more fundamental than the *elective* vs. *required* system, than *modern* vs. *classic* languages, than *literary* vs. *scientific* subjects of training—questions which have been debated *ad nauseam* since McCosh and Eliot crossed their sword in the '80s.

super-human, power, the six preceding forces lead to the PRODUCTION of new ideas and to all the forms of original activity. This is the epitome at once of the 'universal,' both in intellect and in education.

TRUTH, BEAUTY, LEARNING, OBSERVATION, REASON, EXPRESSION, and PRODUCTION, in their most comprehensive forms, are the seven forces of progress, and the *factors of education* are the processes of storage of these forces by coöperation of teacher and student, the former with his constantly diminishing, the latter with his constantly increasing, responsibility. The batteries become ready to discharge, the potential intellectual energies ready to be liberated; and the cunning business or art of the teacher consists in patience and alertness in ways, means, and methods, in repairing or supplying deficiencies, and in discovering powers which are never actually to be idle.

This centrifugal versus centripetal idea, however, was a mere working hypothesis, tested perhaps, or sought to be tested, in my own long search; how about other men? Looking then into the lives of others, of scientists, of artists, of men of letters, I found corroboration. The principle of the seven cardinal elements of education is my own; if it were not I should be false to my profession of origination. It is the product of fifty years of experiment and observation as a teacher, not of reading what other people have written about education. In working it out I had undoubtedly observed and profited by the merits and failures of the work of McCosh, Guyot, Brackett, Balfour, Huxley, and others of my great teachers but it was not until after I had worked it out that I began to scan Spencer, Rousseau, Froebel, Pestalozzi, Montessori, etc. If I had reversed this order and started by reading what others had to say about education, I fear it would have atrophied my creative powers, such as they are.

CREATIVE EDUCATION OF THE CHILD

The intellectual development of the child, as well as of the school boy and girl, fascinated me in the American Museum, where I discovered that the most surprising intellectual predispositions and tastes may manifest themselves at a very youthful age.

I recently listened to a discussion of this subject by J. Howard Whitehouse, warden of Bembridge School, Isle of Wight, and William Wyamar Vaughan, headmaster of Rugby, in which the positive and negative sides were taken, and the advantages and disadvantages, the gains and losses were briefly summarized. Warden Whitehouse, who has recently made a representative collection of actual creative school work in England as a gift to the department of education of New York University, took the side which I am supporting in the present volume, and to show his point of view I may quote from one of his recent works:[1]

> All creative interests which come into the lives of boys are good and may prove of transcendent importance. It is not that we want a boy to cut woodblocks in order to get his living when a man as a wood-engraver, any more than we desire a boy who loves flowers and creates a beautiful garden to become a professional gardener. Such boys in following these and other creative activities are unconsciously forging keys unlocking for themselves the entrance to courts of beauty and of joy—the beauty of all true work, the joy of service and self-realisation expressed in all true work, and to these courts they come with standards of taste and judgement achieved through personal effort and experience, not docilely received from others.

[1] J. Howard Whitehouse: *Woodcuts*, page xi.

So far as I observed in the English school work exhibition at Oxford, the creative movement in certain schools in England has advanced much further than in America; the actual work of the students themselves, in wood-engraving, for example, attains a very much higher level than any of our schools show. On the other hand, in the Lincoln School of New York City the creative school work in literature has already produced a surprising variety of composition in prose and verse.

CREATIVE INTELLIGENCE

The one great force of life is its renewing and creating power, which throughout all Nature marks the impassable line between the life-world and the matter-world. True education takes its keynote from the life-world; it must instill in young and old its renewing and creating power.

Education is such a vastly comprehensive term that it includes every power and function of man as a whole and of every cell of which man's body is composed. You cannot detach the education of the cells of the frontal lobes which distinguish the high order of human brain from the education of the cells of the liver which supply the frontal lobes with chemical reactions necessary to pure rather than to atrabilious thought. We need all the physical and all the psychical powers, and not the least the moral; we need to develop the will, the determination, the energy, no less than the imagination, the individuality.

It is part of my creed that spiritual, moral, and physical forces are absolutely essential as the environment of the intellectual forces, but in this volume I am writing only of the intellectual aspects of creative work. The genius of creative talent relies on the brother geniuses of hard work, of self-control, and of persistent determination. The art of the teacher, whether in school, college, university, or museum, is to discover this creative talent in his students and to encourage it by giving it proper nurture and environment. The creative mind is born, not made; it is an intellectual urge which may manifest itself in one of many thousand lines of activity of the human mind. Whether in industry, science, art, or literature, the impelling motive of creative talent is to add something new or true or beautiful to our civilization. The creative mind may be born quite alone or as one of a group of kindred and productive predispositions, as in a rare genius like Leonardo da Vinci.

The bearing of these reflections on the modern practice of education is obvious. Originative and creative power in the germ is the very oldest of the distinctively human faculties, and the cultivation and development of this power should be the chief end of education, to which all other forces should contribute. Man differs more, perhaps, with respect to this originative faculty than any other animal; there is a pretty sharp division between the sulphidic or productive and original mind and the bromidic or parrot mind. But in educating youth we should always proceed upon the theory that there is some sulphide if we can only discover it; if it is not there we should seek to engender it. With some exceptions our general tendency in education is to encourage the bromidic habit of mind; at least, our systems of premiums and awards and honors and standing are largely designed for exceptional memory rather than for exceptional originality and creative power.

THE JOY OF CREATIVE WORK

Since my regretful retirement in 1908 from active teaching as head of the Department of Zoölogy of Columbia,[1] I have solaced myself as an educator by endeavoring to adapt education to the new problems of civilization and the prospects of the future. From the standpoint of the lofty creative aim of education, the present prospects in America are far from bright, because the imitative element in our civilization is so dominant. More or less servile imitation of the creative achievements of the past lead on to fame and fortune and to other rewards of modern life. Imitation in speech, in manner, in dress, is becoming world-wide, especially through the press and its methods of photographic reproduction. In almost every country beauty and originality of design are giving way to uniform and tiresome mediocrity. Even more lethal or deadly is the mediocre and stereotyped environment of our thought.

Let us, therefore, stoop to simple and primitive methods in order to conquer; let us show our youth that creative work is far more attractive than sport, than any of the modern forms of amusement, than newspaper or magazine reading, than any form of social dissipation, and, above all, that it has far higher rewards than any form of imitative work, however lofty the motive. Let us conclude this prospect with the inimitable apostrophe of Bergson.[2]

Philosophers who have speculated on the significance of life and the destiny of man have not sufficiently remarked that Nature has taken pains to give us notice every time this destiny is accomplished; she has set up a sign which apprises us every time our activity is in full expansion; this sign is joy. I say joy; I do not say pleasure. Pleasure, in point of fact, is no more than an instrument contrived by Nature to obtain from the individual the preservation and the propagation of life; it gives us no information concerning the direction in which life is flung forward. True joy, on the contrary, is always an emphatic signal of the triumph of life. Now, if we follow this new line of facts, we find that wherever joy is, creation has been, and the richer the creation the deeper the joy. The mother looking upon her child is joyous because she has the consciousness of having created it, physically and morally. A man who succeeds in his enterprise—for example, a captain of industry whose business is prospering—is he joyous solely on account of the money he is winning and the notoriety he has acquired? Doubtless these elements count for much in the satisfaction he feels; but they bring him pleasures rather than joy, and whatever true joy he tastes belongs essentially to the consciousness he has of having established an enterprise which marches on, of having created something that goes ahead. Consider exceptional joys like those of the great artist who has produced a masterpiece, of the scientific man who has made a discovery or invention. We sometimes say they have worked for glory and derive their greatest satisfaction from the applause of mankind. Profound mistake! We care for praise in the exact measure in which we feel not sure of having succeeded; it is because we want to be reassured as to our own value and as to the value of what we have done that we seek praise and prize glory. But he who is certain, absolutely certain, that he has brought a living work to the birth, cares no more for praise and feels himself beyond glory, because there is no greater joy than that of feeling oneself a creator. If, then, in every province, the triumph of life is expressed by creation, ought we not to think that the ultimate reason of human life is a creation which, in distinction from that of the artist or man of science, can be pursued at every moment and by all men alike; I mean the creation of self by self, the continual enrichment of personality by elements which it does not draw from outside, but causes to spring forth from itself?

[1] On the presentation of a complete plan for biological teaching in Columbia University, the author was elected DaCosta Professor of Biology (Zoölogy) in 1890. On retiring from the active chair to become President of the American Museum of Natural History in 1908, the author was given the title of Research Professor of Zoölogy in Columbia, in reference to his future dedication to research and writing.

[2] Henry Bergson, Huxley Lecture. Delivered at University of Birmingham, May 29, 1911; reprinted as "Life and Consciousness" in the *Hibbert Journal*, Vol. X, No. 1, October, 1911, pp. 24-44.

THE GOAL OF CREATIVE EDUCATION

There is little doubt in my mind that potential abilities, for the most part, remain undiscovered, for it is often only a happy accident which brings an inspiring object or inspiring idea within the range of the intellectual taste or predisposition. Sometimes this concurrence of predisposition and inspiring object comes early in life, but quite often it happens late in life and after a long career in some pursuit to which one is not fitted by natural endowment. I have in mind two marked cases of this kind of late entrance into a highly successful and productive career; for personal reasons only one may be cited: James Terry, a man of business, while visiting the country house of a friend, was descending a stairway in the dark and groping his way by passing his hand along the wall. Suddenly his hand slipped into an alcove or recess, at the bottom of which he touched a large stone axe or 'celt.' Grasping the celt and hastening to the library, he inquired of his friend where it had been found and if others might be found in the same locality. On the following day he visited the locality, secured other celts and stone implements, and thereupon became infatuated with the subject of American archæology. He abandoned business and devoted the remainder of his life to archæological exploration and collection, thus accumulating the extensive James Terry Collection of the American Museum of Natural History, one of the finest of its kind.

A closely similar experience was that of a merchant of Ipswich, England, J. Reid Moir, who entered upon a career in prehistoric archæology through the casual handling of a single flint implement.

The unhappy people of the world include two classes: those who have no creative talents, and those who possess talents and never discover them. Our goal of creative education, therefore, is to discover the potential abilities in science, art, and literature which undoubtedly exist in the minds and spirits of the youth drawn from the many races which in the past two thousand years have created the science, art, and literature of Europe. Such abilities are often like beautiful, tender, and sensitive plants which soon perish in an unkindly, unsympathetic environment, but which, if fostered and encouraged, will blossom and bear fruit in our material and mechanical civilization, which is inwardly yearning for the True, the Beautiful, and the Good.

The Story of the Museum's Service to the Schools

METHODS AND EXPERIENCES OF THE AMERICAN MUSEUM OF NATURAL HISTORY

By GEORGE H. SHERWOOD
Director of the American Museum and Curator-in-Chief of its Department of Public Education

A DUSTY, musty place where curious and unfamiliar animals are stored and seldom seen, is the average person's idea of a museum of natural history. This popular conception is perhaps well expressed by the little boy who, after spending an afternoon at a museum with his teacher, rushed home and breathlessly exclaimed to his mother, "Oh, Mamma, I have had a wonderful time this afternoon!"

"Where have you been?" asked his mother, and the boy replied:

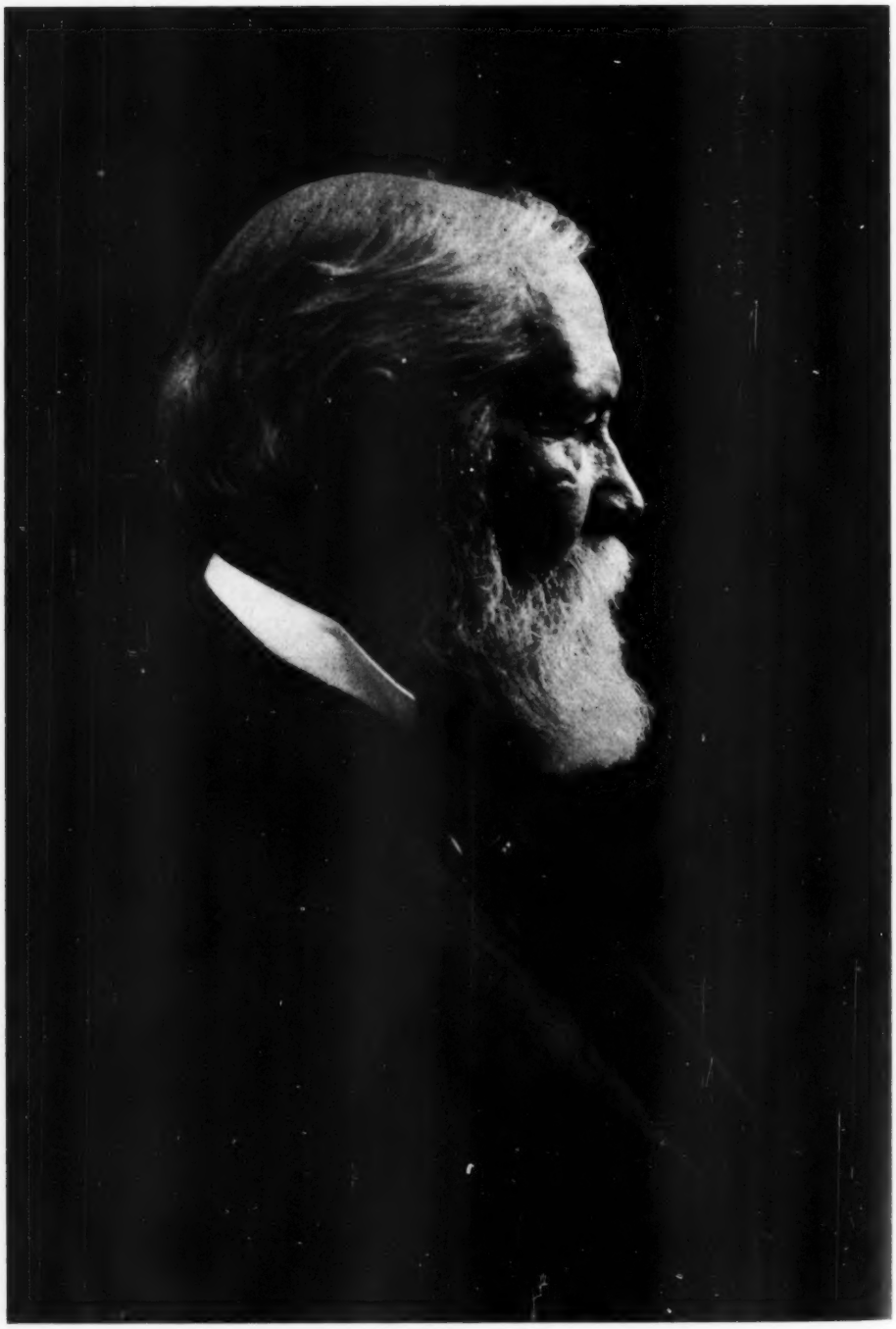
"Oh, teacher took me to the dead circus!"

The modern up-to-date museum is far from being a "dead circus." If it is performing its proper function, it is very much alive. It becomes a part of the life of the people. It is not enough for it to be a safe-deposit for valuable records, for strange and beautiful specimens, and to accumulate a vast store of information. It must be prepared to make that information available for the people. Museums stand as the great exponents of objective teaching and the modern museum has become an aggressive force in education. This is particularly true of natural history museums.

Through improvements in the technique of preparation, through attractive and readable labels, through the development of the habitat group—which shows the inter-relation and interdependence of life, the exhibition halls of the up-to-date natural history museums have become veritable magnets which draw both young and old. The attractiveness of the exhibition hall presentations reflects the arduous efforts of the explorers and field workers, who have penetrated to remote corners of the earth to assemble facts; and the careful and painstaking study of the curator who has coördinated these facts and drawn from them the proper deductions. It is, however, through direct contact with the school system that museums have become entitled to consideration as important factors in education.

The American Museum of Natural History claims to belong to the modern museum group and the purpose of this article is to set forth the various phases of the service which it is rendering to schools, colleges, and universities.

The group of public-spirited citizens who organized and founded the American Museum of Natural History in 1869 realized the possibility of service to the schools on the part of the Museum. The general educational value of its collections and exhibits was widely accepted, but as the institution grew, it became more and more evident that if the Museum was to fulfill its function it must establish closer relations with the public schools and the educational system. The desirability of museum extension was thus early recognized and the first steps in accomplishing this were taken in 1880, when the Trustees authorized Albert S. Bickmore—the superintendent of the Museum—to prepare for the public school teachers a special course of



ALBERT SMITH BICKMORE
1839–1914

Professor Bickmore originated the plan of the American Museum in 1868, and from 1880 to 1904 was the first curator of its department of public education

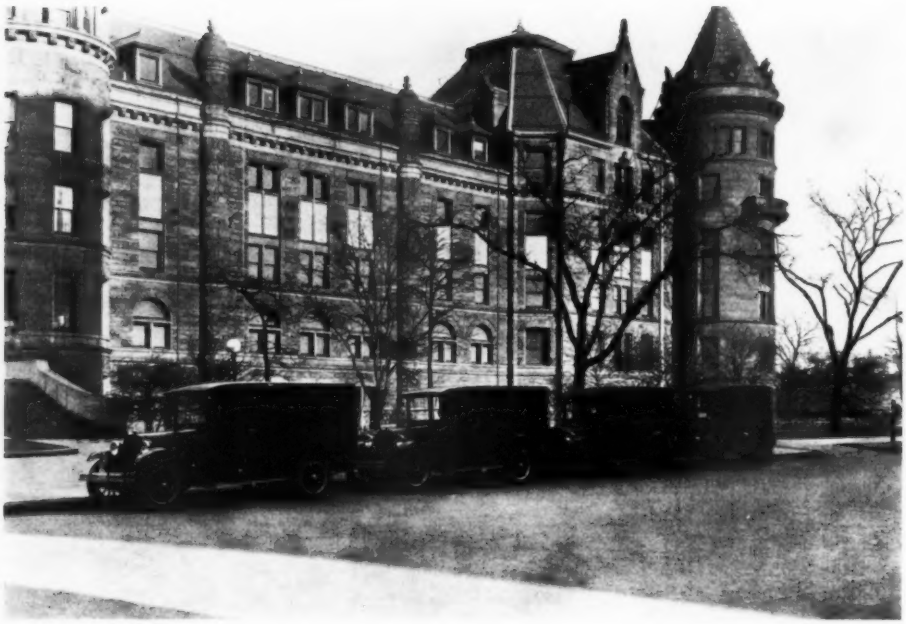
lectures on natural history to be given at the Museum and to be illustrated with Museum collections. Thus began the system of visual instruction so closely identified with Professor Bickmore's name. Professor Bickmore was a pioneer in education by the visual method. When he took hold of the work, the technique of making lantern slides was in its infancy and simple projection machines had not been developed. He applied himself to this new field in education with the same enthusiasm and persistence which had enabled him to create the American Museum of Natural History; for it was he, more than anyone else, who brought together the Founders of the Museum and fostered it in its early days.

Professor Bickmore ransacked the corners of the earth for the best materials. There was not a traveler of note who came to New York, whom he did not seek out and ask for negatives. He journeyed to remote lands himself to obtain first-hand information, and in later years often sent out special photographers in order to obtain the best results possible. One of the greatest contributions which the American Museum has made to education is this work of Professor Bickmore. Even today, notwithstanding the great advance in photography, the excellence of a "Bickmore slide" is seldom, if ever, surpassed. Professor Bickmore directed this educational work until 1904, when ill health compelled him to retire from active service.

The keynote of this first period of the Museum's educational activities (1869 to 1904) was instruction for teachers. That of the second period (1904 to 1927) is instruction for pupils. During the first period, the scope of the work included the schools of the entire state. In the second, attention was focussed primarily on the schools of New York City, because after 1904, the State withdrew its financial support, while the City gradually increased its appropriations for maintenance. It was proper therefore, that the Museum should give its attention, first to the needs of the City schools, rather than to those of the State. Moreover, the introduction of nature study into the curriculum, the development of modern pedagogical methods, the growth of libraries, the perfecting of projection apparatus—which made material for illustrated lectures more practicable—and the continued increase in the wealth of the Museum's educational materials naturally all contributed to direct the workinto new fields. The means of instruction which have been developed by the American Museum during the last twenty-three years, are designed to meet the conditions of the New York City school system. They are, however, based on such fundamental pedagogical principles that they may easily be modified to apply to any school system.

The Museum's program of school service has the hearty endorsement of the Board of Education, superintendents, and other school officials, but the conduct of the work is left entirely to the department of public education of the Museum, which is responsible for the relation with the schools. This action on the part of the school authorities has been an important factor in the success of the work, because it has simplified service and because it brings the Museum's staff into direct contact with the principals and teachers, thus leading to a better understanding of their needs.

The members of the Board of Estimate and Apportionment too, have



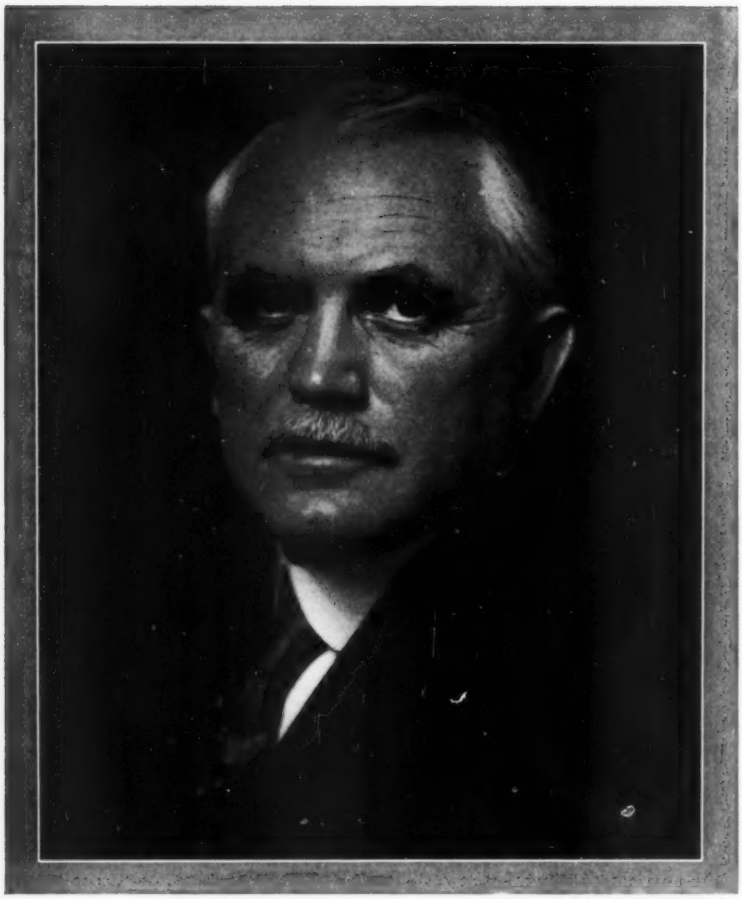
For school delivery service.—Throughout the school year this fleet of cars is kept busy distributing and collecting motion-picture films, lantern slides, and natural history specimens lent by the Museum to the public schools

Large groups of children often are conveyed to the Musuem in buses which are arranged for by interested and enthusiastic teachers. Each child contributes his own fare, which is purely nominal

Photograph by Fowler

HENRY FAIRFIELD OSBORN, LL.D., D.SC.
President of the American Museum of Natural History

Educator, author, administrator,—always a student with his students,—Professor Osborn early in his career independently formulated the theory of creative education and applied it throughout his fifty years as a teacher. During his administration as president of the American Museum there has been a notable advance in the teaching value of the Museum exhibits through attractive grouping and posing, and his presentation of the collections has become a standard for other institutions. His work in public education was acknowledged in 1923 by the Roosevelt Memorial Association in the award of the Roosevelt Medal of Honor

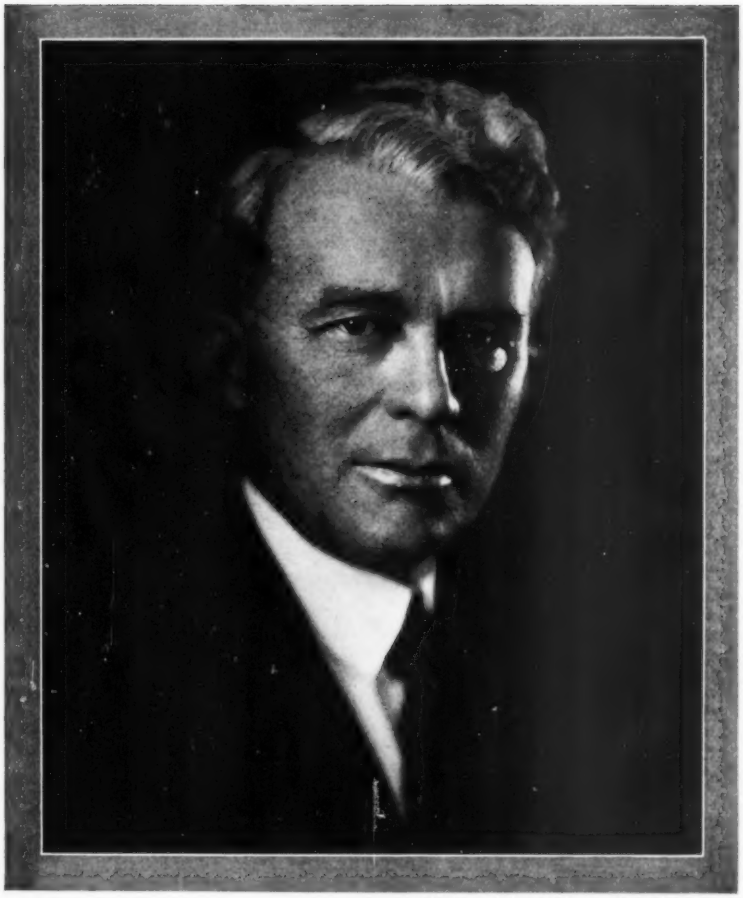


Photograph by J. H. McKinley

GEORGE H. SHERWOOD, A.M.

Director of the American Museum of Natural History and Curator-in-Chief of its Department of Public Education

Mr. Sherwood came to the American Museum from Brown University, and for twenty-three years has been head of the Museum's department of education. It is under his supervision that the present methods of the Museum's extensive coöperation with the schools of New York City have been developed. Mr. Sherwood is a practical teacher who believes that the training of children is the most important vocation in the world



Photograph by Underwood & Underwood

CLYDE FISHER, PH.D., LL.D.

Curator of Visual Instruction, American Museum of Natural History

Doctor Fisher's practical experience in the schools of Ohio and Florida, his training at Johns Hopkins University where he received his doctorate in botany, together with his enthusiasm as a teacher, have developed to a high degree his natural, rare talent of stimulating interest, and imparting knowledge to young people. He has been a member of the education department for fourteen years, and has rendered exceptional service in promoting the growth of the Museum's methods of visual instruction

Photograph by Julius Kirschner

GRACE FISHER RAMSEY

Associate Curator, Department of Education, American Museum of Natural History

Through her training in the Buffalo State Normal School, of which she is a graduate, and her twelve years' experience as a teacher of science in the high schools of New York State, and as director of Nature Study and School Gardening, Mrs. Ramsey has gained a clear conception of the needs and requirements of teachers. During the eight years she has been connected with the department of education in the American Museum, she has had the responsibility of developing its extensive lantern slide service, and has recently been placed in charge of the motion-picture loans to the schools of the city

expressed their belief in the value of the Museum's service to the schools by providing for the construction and equipment of a special building—the School Service Building—to house these activities. This splendid new equipment will enable the Museum to increase its usefulness to teachers. The School Service Building will be described later in this article. The Museum service is not local, for the Museum messengers penetrate all boroughs of the city and deliver our visual instruction material free to any school anywhere in the Greater City.

While the department of public education is the agent of the Museum in its contact with the schools, the department is in large measure dependent upon the other scientific departments for the wealth of nature material which it can offer to the schools. The Museum explorations bring together rare and valuable collections; the researches based on this material and the published results represent the work of the respective scientific departments. It is the function of the department of public education to digest this material and to present such portions of it as will be useful to teachers and pupils.

The various branches of the Museum educational work fall under two main headings, namely: (a) Extra-mural activities—Museum service in the schools, and (b) Intra-mural activities —School service at the Museum. Under the first group are the circulating nature study collections, the distribution of lantern slides and motion picture films, lectures in the schools and in special lecture centers, and the circulating collections loaned to the branch libraries. The intra-mural activities include lecture courses at the Museum—instruction for the blind and sight conservation classes; exhition-hall instruction and guidance for visiting classes; coöperation with the training schools for teachers, the high schools, and colleges, and coöperation with nature organizations such as Boy Scouts, Girl Scouts, and similar groups.

The extent of this service is indicated by the following statistics showing the scope of the work in 1926:

Pupils using nature study collections	765,790
Pupils and teachers attending lectures	171,769
Attendance at library loan exhibits	32,592
Pupils viewing motion picture films	530,955
Pupils viewing lantern slides	4,358,423
Total number of school children reached by educational activities	5,859,529

The oldest feature of the Museum's School Service is the distributing of nature study collections. This work was begun in 1904, at about the time when nature study was introduced as a subject in the curriculum of the New York Public Schools. Its purpose was to place in the hands of the teacher, so far as practicable, the actual specimens required in her work. The collections are of small size, each being contained in a wooden carrying case about the size of a large suit case. The material comprises representative specimens of mammals, birds, insects, lower invertebrates, minerals, woods, and public health charts and exhibits.

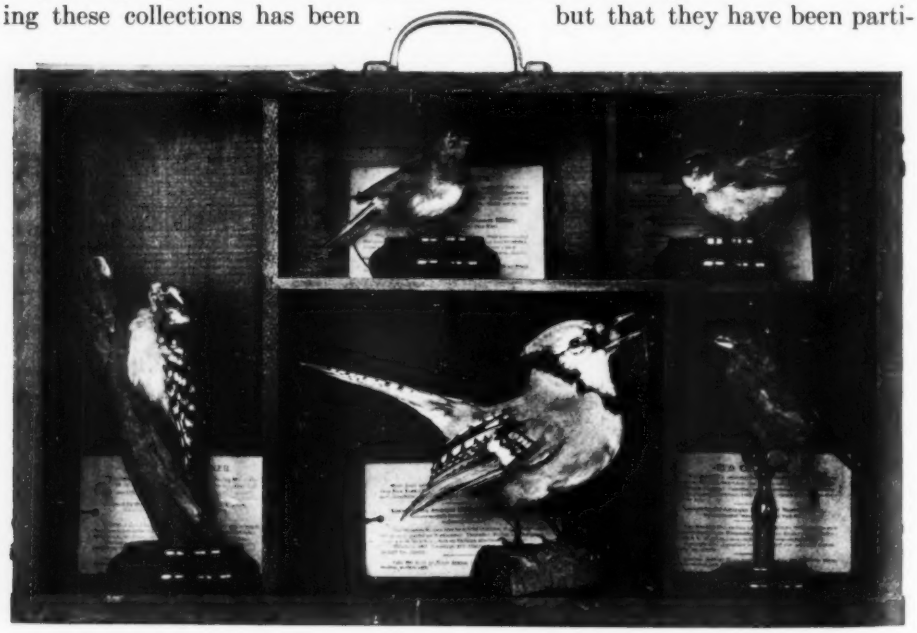
Recently we have added to our circulating collections a series of the habitat group type which is intended to give more of the environment of a species than is possible with a hand specimen. For example: the set labeled "Birds That Are Our Friends" has a painted background showing rolling fields with trees in the distance, while perched on a tree in the foreground is a screech-owl with a mouse in his beak;

on the ground a pair of quail or bobwhite are eating seeds; a cuckoo (an insect eater) is resting on a trunk, and near by is a goldfinch. These birds are useful to man in saving his crops from insects, weeds, or vermin.

One of the most important factors in the growth and development of the circulating nature study collections is the fact that these are loans and not gifts to the schools. A former teacher once said "If you wish a friend really to read a book, lend it, do not give it to him." Following this principle has maintained a personal contact between the staff members of the Museum's educational department and the teachers, which has vitalized the work.

Realizing that a teacher's time is fully occupied, the method of obtaining these collections has been made as simple as possible. The Museum furnishes blanks upon which the principals make application for the collections, and indicate the sequence desired. Delivery is then made by the Museum messengers, who call again at the end of the loan period—that is, in three or four weeks—and replace the first exhibit with another.

To the question, "Is this method of visual instruction worth while?" the following statistics are in themselves a sufficient answer. In 1926, from a total of 600 schools 443 were regularly supplied, and 970 collections were in circulation, while the total number of pupils studying the collections was 765,790. Certainly, if these nature-study collections were not practical, we would not have so many busy teachers beseeching us for this material. We learn from the teachers that not only have the collections proved their value in teaching facts about nature, but that they have been particularly useful in language work, especially with foreign-born children.



The blue jay set.—These specimens may be easily removed from the case and handled by the pupils

Perhaps their greater service, however, is giving these city children

a glimpse of the great out-of-doors. The country dweller has very little conception of the limited horizon of thousands of these children in the congested parts of the city. Many of them never get more than a few blocks from the place where they were born. The school building is the limit of their travels. The dog, the cat, and perhaps the horse are the only animals they have ever seen. The vegetable market window and the push-cart represent their knowledge of flowers. No wonder, then, that the little nature-study exhibits from the Museum stimulate their imagination and broaden their outlook!

Birds that are our friends.—One of the small habitat-group cases of birds with explanatory labels, circulated among the city schools

The following observation gives some idea of this restricted environment. A teacher brought her class to the Museum to hear one of the illustrated lectures. Many of these pupils had never been on an elevated train before, although they had seen the trains go thundering by daily. Several of the girls were car-sick.

Through the Alice R. Northrup Memorial, pupils of the city schools who have done efficient work in the nature rooms of the School Nature League are taken for two weeks to a farm in the Berkshires. The first morning after arrival one little girl from the lower part of the city saw a horse grazing in the yard. She burst into sudden laughter and exclaimed:

"What a funny way for it to eat!"

"How should it eat?" she was asked, and she replied in digusted tones,

"Out of a nosebag, of course."

The phase of our school service which has had the most remarkable development and which probably serves the greatest number of teachers, is the lantern slide circulation. The Museum has unrivaled opportunities to secure material for the making of slides for school use. A photographic outfit forms part of the equipment of every expedition sent into the field. As our expeditions reach all parts of the earth, the photographic results have enriched our library of photographs until we now have more than 125,000 negatives upon which we can draw for illustra-

tions. Our library of lantern slides, of which Professor Bickmore's superb collection of slides formed the nucleus, number more than 70,000 and cover not only natural history topics but also geography, history, industries, and in fact, nearly every phase of human endeavor—past and present.

In 1914 the Museum offered to make these slides available to the teachers of the city on a loan system by which the slides would be delivered to any school in the city by Museum messengers—as is done in the case of the nature study collections. The Board of Education approved this

Above.—Lantern slide room in the School Service Building.—From here more than 800,000 lantern slides were circulated without charge to New York City schools in 1926

Below.—The shipping room in the School Service Building.—Here are some of the orders of lantern slides packed for the day's delivery to public schools

proposition and until the present year made a small appropriation, which in 1926 amounted to $3750, for its support. This appropriation, however, covered only a fraction of the actual cost which in 1926 totaled approximately $22,000. At the present time the *entire* cost of the slide distribution, as well as of the other branches of our educational activities is borne by the Trustees either from their own funds or from appropriations for maintenance by the City.

The growth of the slide service has been phenomenal and its extent can be seen at a glance from the following statistics:

	1917	1920	1923	1926
Number of P. S. borrowing	84	154	240	320
Total number loans	1,131	2,435	9,677	18,470
Total Slides	63,111	138,133	440,315	808,789

The value of this visual instruction material to teachers is obvious. The slides cover a wide range of subjects which are taught in the classroom. The use of the slide in classroom and assembly simplifies the teacher's task and enables the pupil to absorb information more quickly and permanently.

Teachers may make their own selection of slides from our library. Realizing, however, the many demands upon a teacher's time, we have anticipated their needs by preparing a series of lectures illustrated with from thirty to eighty slides and accompanied by a suitable manuscript which enables the teacher to give a lecture with a minimum of effort. There are now some seventy of these sets in service. The slide librarian has also selected about 200 small groups of slides illustrating topics of grade work, without manuscripts. Catalogues of the lecture sets and groups, as well as of the general slide collection, are sent to teachers who can then make their selection of material according to classroom needs. The great desideratum of the slide service is duplicate slides. Unfortunately the great majority of our slides are not duplicated and this is true of many of the prepared lecture sets. The demand for this material is so great that some of the lecture sets are reserved eighteen months in advance. A fund of from $10,000 to $15,000 or any part of it would assist in relieving the situation. Here is a concrete instance where a friend of the Museum could confer a great boon on teachers and enrich the lives of thousands of children by providing the means for duplicating slides—the value of which has been proved.

Experience has shown that both the lantern slide and the motion picture are important aids in visual instruction, and one supplements the other. To supplement its slide distribution the Museum has also established a film service which is growing rapidly. The Museum messengers deliver the films to any school in Greater New York that desires them and there is no charge. In 1926, 91 schools were supplied and more than 2000 reels were loaned, while the number of children that saw them was more than 500,000.

In building up our film library we have had two objects in view, first, the preservation of important natural history records, and second the acquisition of material for service to the public schools, and the Museum has been most fortunate in securing such an excellent series of motion pictures. Our pictures have been secured by

Indians of the Eastern Woodlands.—One of the many special exhibits lent to public libraries of the city

gifts from friends of the Museum, by members of the Museum staff on expeditions, and by purchase. Our library includes "How Life Begins," by George E. Stone; "Nanook of the North," by Robert J. Flaherty; "Merin the Nomad," and other Mongolian pictures, by Roy Chapman Andrews and James B. Shackleford; "Trailing Wild Animals in Africa," by Martin Johnson; "The True North" by Captain Jack Robertson; three sets of the Yale Chronicles of America Photo Plays; "Everyday Life of the People in France," by Mr. and Mrs. Philip H. Pratt; "Adventures of a Gray Squirrel," and others pictures of mammals, birds, and wild flowers, by Clyde Fisher; and in addition, many reels presented by Mr. George D. Pratt and other friends.

Recently the United States Bureau of Mines has selected the American Museum of Natural History as a depository and distributing center for its films. These are mainly on industrial subjects. Already 69 reels have been added to our loan series.

Twelve reels of Canadian subjects have been deposited with the Museum from the Canadian Government Motion Pictures Bureau, Department of Trade and Commerce, and 4 reels by the Consolidated Gas Company of New York.

The Museum's film library is also augmented by the renting of suitable films from non-theatrical or theatrical distributors. Many of the school lectures by members of the Museum staff are illustrated with such films.

It is not enough that the Museum supply specimens, lantern slides, and films to the schools. There is an ever-growing call for lectures in the schools. These requests have been met so far as our limited staff could be made available. As a branch of its lecture

service, the Museum has been giving a series of illustrated talks for children in certain centrally located schools, with the object of giving the pupils the benefit of our lectures without the expenditure of carfare to the Museum —a very serious matter in many families.

For several years the lending of nature-study material for schoolroom use has been well supplemented by the special exhibits lent to public libraries of the city. In the Museum's study collections are clothing, pottery, baskets, industrial models, dolls, implements of war, birds, animals, and many other types of specimens that can be used with success to illustrate books on travel, geography, nature-study, history, art, and current events. From these through the coöperation of the department curators, circulating loan exhibits are selected. By arrangement with the librarians such exhibits are installed for varying periods in the children's rooms in the libraries.

The primary purpose of these exhibits is to stimulate the children to read good books. More often the collections form the basis of definite coöperation between the schools and the libraries. Children who are studying Mexico in the classroom are taken by their teachers to the library, where they examine the Mexican material loaned by the Museum and read books describing that country; children who are studying "The Song of Hiawatha" visit the library to see Indian collections, and boys and girls who are learn-

Art students copying Indian designs. Ancient Peruvian fabrics give inspiration for modern patterns

ing the principles of design go with their notebooks to copy the decorations on Indian baskets and pottery.

This coöperation with the libraries takes the Museum to the neighborhood. Oftentimes, moreover, these exhibits awaken the spirit of research, bring both the child and his parents to see the extensive collections at the Museum, and then send them back to the library for further reading.

A public school lecture in the Museum auditorium.—Annually more than 170,000 school children attend these lectures

Important as are the museum aids in the classroom, of equal or even greater value is the assistance which the Museum can give when teacher and pupils come to the Museum. First among these intra-mural activities are the lecture courses, if numbers are taken as the criterion. Annually more than 170,000 school children attend these lectures.

As in the case of the circulating nature study collections, the underlying purpose of all these lectures is to *supplement* the classroom work of the teacher—not to *replace* it.

The subjects are chosen with special reference to the prescribed courses of study, and deal particularly with topics in geography, history, and natural science. All are illustrated with colored lantern slides and also, for some years past, with motion pictures.

Whenever practicable, the subject matter of the lectures is correlated with the exhibits in the Museum. For instance, if the lecture is on the "Early History of New York City," reference is made to the Indians of the Eastern Woodlands Hall, where the life of the Indians of Manhattan is depicted; if the subject is "Physiography of the

United States," reference is made to the halls of geology and to the halls of the great vertebrate fossils, where early earth history has been visualized. A lecture on "Hiawatha's People" will be correlated with the mammal and bird exhibits, as well as with the Indian halls.

Most of these lectures are adapted to the needs of elementary classes. Recently in evaluating our work with the schools, we questioned the value of certain motion pictures shown in these courses, particularly "Treasure Island," "Robin Hood," and "Huckleberry Finn," thinking that after the children had seen the picture they would not think it worth while to read the book on which the film was based. Our doubts were removed when we learned from a teacher that not only did the showing of these films stimulate the children to read these classics, but led the parents, especially the foreign-born, to come to the school to find out where they could buy these books. The children talk about the picture until parents become interested and want to know more about the story.

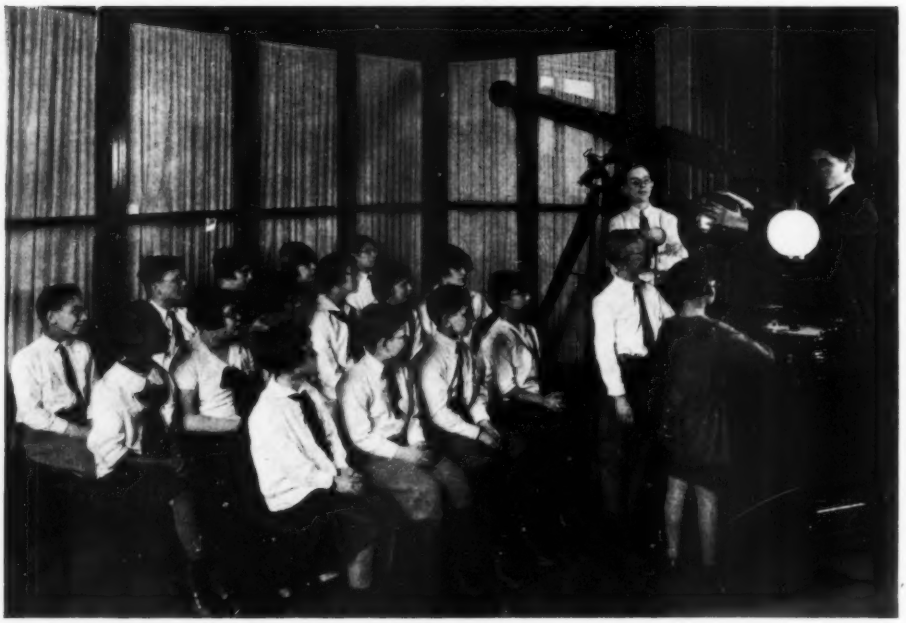
Recently one teacher asked for our unused lecture program announcements. These she gave to her pupils, who took them home. One mother came to the school to express her gratitude to the teacher for taking her children to the Museum, and said that while formerly her husband spent a great deal of time away from home, now they all gathered around the table at home to read the story books based on the Museum lectures. Thus, our lectures may indirectly aid in bringing the family groups closer together and in establishing better standards in the minds of children and parents.

In addition to these regular courses of lectures for school children, members of the Museum staff lecture at the training schools for teachers, with the purpose of presenting to the pupil-teachers certain background topics on which they are especially well qualified to speak. The result of this relation to the training schools is far-reaching.

Many special lectures are given to visiting classes, especially from the high schools. Twice a year during Regents' Week, the examination period, the biology classes from several of the high schools are brought to the Museum, given a lecture on some biological topic in the auditorium, and then sent into the exhibition halls with a questionnaire for further study. Thus for these classes, as well as for groups of Boy Scouts, Girl Scouts, Woodcrafters, etc., the Museum exhibition halls serve for great indoor field trips.

A specialized branch of the Museum's educational work is the instruction for the blind which has been developed through a special endowment, the Jonathan Thorne Memorial Fund. The blind children in New York City are taught in the same public schools as normal children. They are grouped in sight conservation classes and taught by trained teachers under the guidance of a special supervisor. In the Museum's program of visual education special provision is made for these children. In consultation with the Supervisor for the Blind, informal talks which can be illustrated with actual specimens or with apparatus are prepared by the Museum staff under such titles as "Birds of Our Parks," "Indians of the Plains," "Animals That Give Us Clothing," "Sea People and Their Castles," "The Change of Seasons."

The results from this work are gratifying. Often they are read in the children's happy faces. Again, they are



Why seasons change.—The use of the Uranisphere in a Museum classroom makes it easy for children to visualize the causes of the change of seasons

seen in the direct expression of these boys and girls in essays based on the lesson.

Another important branch of our intra-mural activities is the exhibition hall instruction and guidance. The well-labeled exhibition hall, with its habitat groups, its carefully selected specimens, and its well thought out arrangement, stands as the great silent teacher, a true exponent of visual education. What a vast store of information is contained in these halls, and what an aid they are to teachers in giving to their pupils accurate knowledge of nature!

Experience has shown, however, that a well-labeled hall is not sufficient, and in order that a group of children may obtain greater profit from their visit to the Museum it is necessary to have specially trained instructors who understand the child's point of view and can interpret the exhibits for the children. The inadequacy of even a good label, because of lack of knowledge or carelessness of the teacher, is illustrated by the following incident, which occurred in one of the halls recently.

A teacher with a class of a dozen children stopped before the case containing an African lion, part of an exhibit intended to show the difference between past and present methods of taxidermy. The label on the case reads

TAXIDERMY
PAST AND PRESENT
AFRICAN LION, MOUNTED AT THE MAISON VERREAUX, PARIS, ABOUT 1867

The following conversation was overheard:

"Now, children, look at this animal! See how ferocious he is! See his bushy mane! This, children, is a taxidermy. Now, children, what kind of an animal have we here?"

And the twelve little voices piped up proudly, "This is a taxidermy."

The exhibition hall instruction by

our staff members has not been systematized and fully developed because, until the School Service Building was erected, we did not have suitable facilities for correlating this instruction with classroom work. For years the teachers have been bringing groups for study and examination of the principal exhibits, and the department of education has been supplying instructors for them, so far as practicable. This instruction has been adapted especially to children. The exhibits of the halls are so comprehensive and so accurately executed that these tours of the Museum are equivalent to field trips, and there is great opportunity to enliven the classroom work in geography and history by correlation with such trips. How much more significant to the pupils is the history of Manhattan Island if they have had an opportunity to visit the Hall of the Indians of the Woodlands and see for themselves what the Manhattan Indians were really like, what kind of houses they built, how they were dressed, how they obtained their food, and how they played. Similarly, a class which is taking up physical geography can better understand valley formation and mountain erosion by a visit to the Hall of Geology than by many days spent on text books.

During the current year a definite plan was initiated to have classes from the neighboring schools visit the Museum for definite instruction by the Museum docents. The pupils were assembled in one of the sample class rooms, where specimens had been placed which could be handled by the children. Under the guidance of the Museum instructor, they were made familiar with the objects and learned their significance. After a half hour in the classroom, the groups were taken into the exhibition hall, where the larger collections were seen. The development of this phase of the Museum work is one of the most important features of our future growth. The instructor, or guide, plays an important rôle in interpreting the exhibits to the school children and to the public. The keenness of the children, their enthusiasm, and their desire to know the why and wherefore of things, make this work most interesting. The personal observations of the children and of adults, while at times amusing, give food for thought. Three small colored boys, all eyes, were standing in front of the snake-bird group, looking at a mother bird feeding her young by regurgitation. In this process the young pushes his beak far down the mother's throat for the food.

One of the little chaps announced with pride, "My mother told me she was feeding them."

The other two chorused violent protestations.

A heated argument followed, and with finality one said, "Aw, say, can't you see? She's eating them."

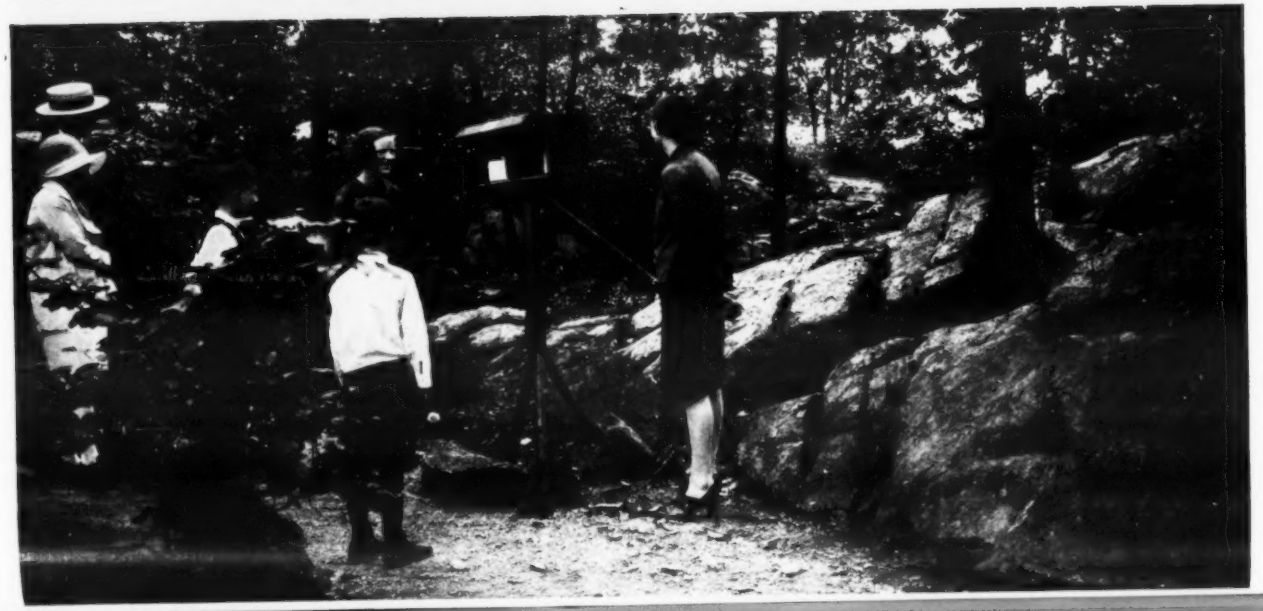
The discussion was finally closed by the boys' appealing to a Museum instructor, who chanced to be passing through the hall, and the first boy's pride was restored when the instructor told them that the mother bird was feeding the young and explained the process.

In the Habitat Bird Group Hall is shown a group of man-o-war birds, in which the male birds have a large, inflated, red air-sack on their throats during the breeding season. Two little Italian boys, about ten and eleven years of age, were standing wide-eyed before this group.

"Oh see!" said the ten-year-old to his companion, pointing to the air-sack

THE BEAR MOUNTAIN NATURE MUSEUM

This museum was provided through the interest of the American Association of Museums, and at the invitation of the Interstate Palisades Park Commissioner the American Museum has undertaken to operate it



A TADPOLE STORY

A portion of the Bear Mountain Nature Trail and Trailside Museum, operated by the American Museum. Photographs by Leroy Davies

of the male bird "See that bird's Adam's apple!"

As a further step in making the exhibits more significant to the children, trails are being laid out in several of the halls, so that children may follow them and in this way gain a greater knowledge of the subjects. Questionnaires have been prepared, more particularly for the use of classes from the high schools and colleges. Nature games have been introduced and are greatly enjoyed by the children to their profit. This phase of the Museum work is only in its infancy, but is now to be developed since adequate facilities are available.

Our educational department has also participated in the maintenance of the Nature Trails originated by Dr. Frank E. Lutz at the station for the study of insects near Tuxedo, New York. This pioneer work of Doctor Lutz has given great emphasis to the outdoor nature movement and has been adopted in many of the camps for boys and girls. On the invitation of the Interstate Palisades Park Commissioner, the Museum has undertaken the operation of the Nature Trails and Trailside Museum at Bear Mountain which was initiated and provided for by the American Association of Museums. This is frankly an experiment, but the numbers who are daily visiting the trails indicate their practical usefulness.

The most important recent event in the Museum's educational program is the construction and equipment of the School Service Building by the city of New York. This, for the first time, gives the Museum adequate facilities for caring for the teachers and classes coming to the Museum, and better facilities for those activities where the Museum goes out to the schools. The Board of Estimate provided for the building in 1922, and the construction was completed in 1926. The equipment is nearly installed, and it is planned to open the building formally in the fall. The School Service building is a basement and four-story structure, 160 feet long by 90 feet wide on the first floor, and 55 feet wide on the upper floors. It is thoroughly fireproof in its construction, and has been most carefully planned to take care of the Museum's needs in its School Service work.

The four floors are assigned as follows:

First floor: Education Hall, reserved for temporary exhibits.

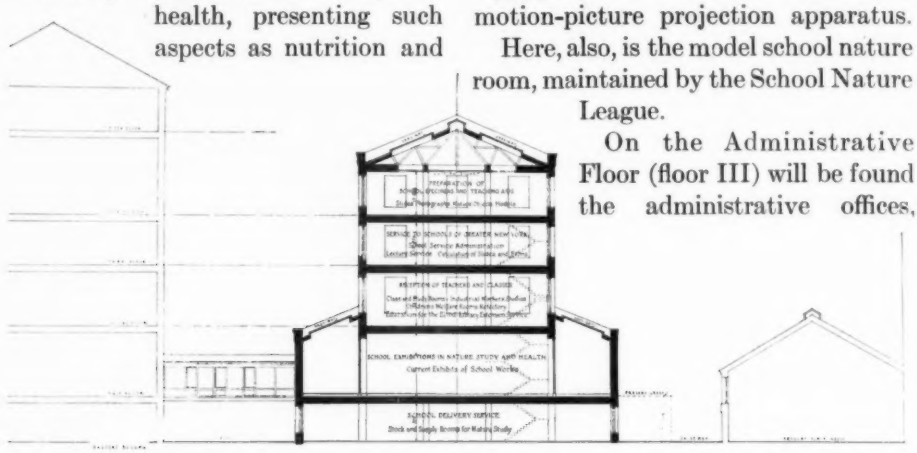
Second floor: Reception floor to provide for classes visiting the Museum.

Third floor: Administrative offices, study rooms. library, and activities connected with the extra-mural work of the Museum.

Fourth floor: the production floor, where photographs and negatives are cared for and the photographic studios are located.

Education Hall, on the first floor, will be entered through the Bickmore corridor, designed as a memorial to the late Prof. Albert S. Bickmore, the originator of the American Museum of Natural History. Here will be placed Professor Bickmore's bust, and a marble tablet commemorating the great educators of history from Socrates to Agassiz. There will also be a tablet to the benefactors of the Museum's educational work, and the memorial tablet to Jonathan Thorne, in whose memory was given the endowment for the education of the blind. Education Hall, itself, is a beautiful room, 160 $\times$90 feet, and is one of the finest exhibition halls in the Museum. At the westerly end of the hall is placed a

statue of William H. Maxwell, first Superintendent of Schools of New York City, presented to the Museum by the Maxwell Memorial Association. On the north side of the hall will be installed permanent exhibits on public health, presenting such aspects as nutrition and public sanitation. It is intended also that this hall shall serve as a reserve auditorium. Consequently, a platform is being erected at the westerly end of the hall, and seating provision may be made for approximately 1000 people. It is equipped with both stereopticon and motion-picture projection apparatus. The primary purpose of this hall, however, is to reserve it for temporary exhibitions of current interest. For instance, if it is desired to show the people of New York City what is being accomplished by the vocational schools, here is the place for it. In fact, it would be available for a demonstration of any school activities that the Board of Education might wish to take up.



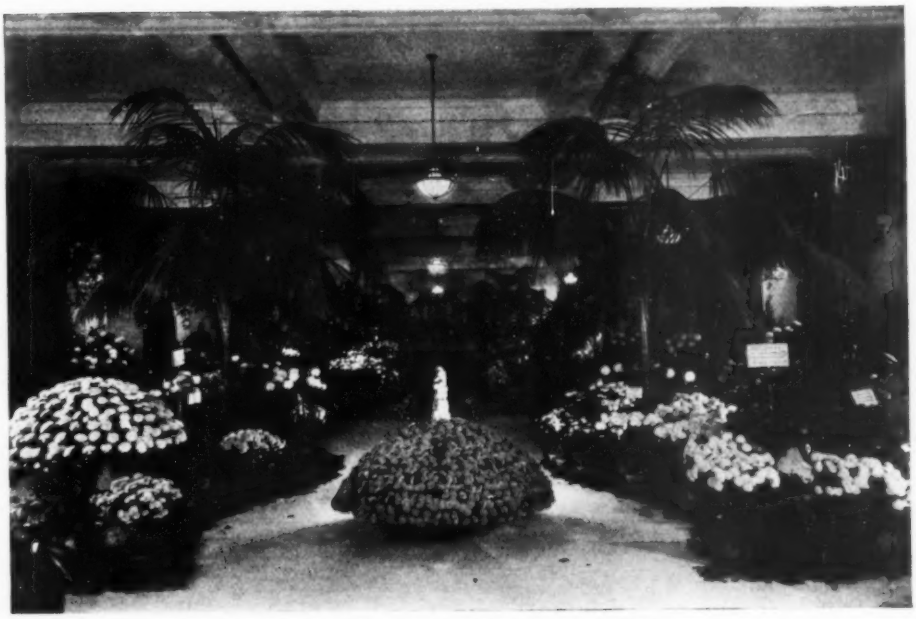
Transverse Section of the School Service Building

The principal feature of the Reception Floor (floor II) is the classrooms of various sizes to accommodate small and large groups of pupils or teachers. Special provision is made for the instruction of the sight conservation classes on this floor, and there is a duplex assembly room which has a maximum seating capacity of approximately 400. A rolling partition quickly converts this into two assembly rooms. Each of these is thoroughly equipped with modern slide and motion-picture projection apparatus.

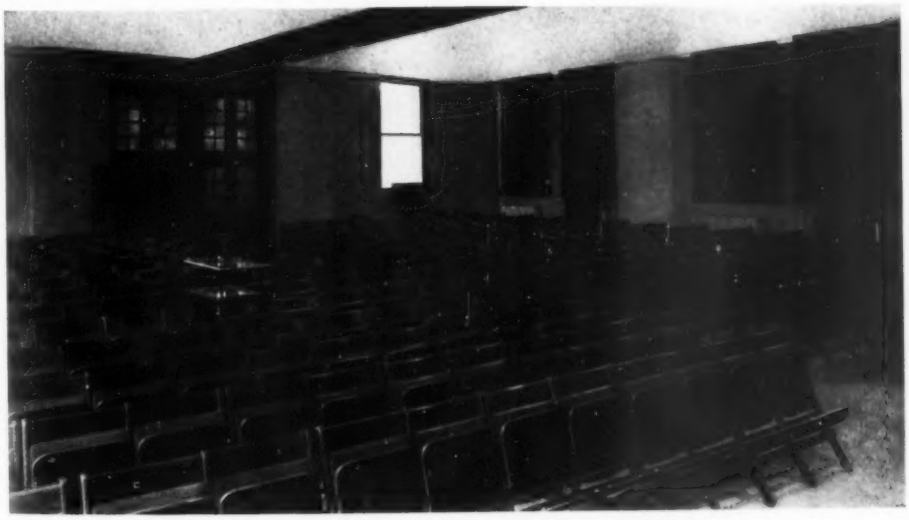
Here, also, is the model school nature room, maintained by the School Nature League.

On the Administrative Floor (floor III) will be found the administrative offices, comprising a suite of three rooms, the library of lantern slides with offices, shipping room, and laboratory. A unique feature of this division is the teachers' consulting room, which is equipped with illuminated tables for the easy examination and study of slides. Teachers may examine slides in this room, arrange their lectures, and practise them in a sample projection room adjoining. On this floor is also a college classroom, equipped with tablet armchairs, the teachers' reference library, which will be supplied with the best nature books and with current periodicals pertaining to their work. Here, also, is the office and laboratory of the division of public health.

The Production Floor (floor IV) comprises the library of photographs and negatives, four dark rooms for the production of photographs and slides, the slide colorist's room, the film-cutting room for the editing and care of the motion-picture films, and a sample



Last year's fall flower show in Education Hall



Duplex assembly room in the School Service Building

projection room for examination of slides and films.

With this splendid structure available and its practical equipment, the Museum is in a position not only to extend its service to the schools, but to render it more effective.

The department of public education does not limit its works to schools only. It has encouraged all movements designed to stimulate public interest in outdoor nature education, and has actively participated in several of them. For years the Museum has been

These especially designed illuminated tables in the teachers' consultation room prove most valuable to teachers in the preparation of lantern-slide talks

coöperating with the School Nature League which is doing such splendid work in taking nature into the schools. The League slogan is "A Nature Room in Every School," and the value of these rooms in the life of the child can hardly be overestimated. Recently an even closer coöperation with the League has been instituted by giving the League headquarters in the new School Service Building where a model nature room is being maintained.

The Boy Scouts, Girls Scouts, Woodcraft League, Campfire Girls and similar organizations are making extensive use of the Museum collections and exhibits, and in some instances the tests for merit badges are given by our staff members.

In the foregoing article we have presented the principal features of the methods of visual education employed by the American Museum of Natural History. We make no claim that they are new to education. They have been modified to meet the conditions in New York City. The Museum's wealth of material in its exhibition and study collections, its miniature collections which are sent to the schools, and its extensive series of negatives and slides freely available for school use, give the New York child a rare opportunity to visualize his geography and history lessons—which, in a measure, is some compensation for his lack of contact with the outdoor world.

The Museum's Part in Nature Education

FROM PHOTOGRAPHS OF THE EXHIBITS IN THE AMERICAN MUSEUM

ON FAMILIAR TERMS WITH THE "KING OF THE NORTH"

A polar bear in his appropriate setting of snow and ice is rather beyond the range of experience of most children. But these youngsters from the New York City schools don't have to "just imagine" a polar bear. They know from close association with this one in the American Museum of Natural History just how big he is and how his white coat hides him in the Arctic landscape

CORRECTING A MEDIEVAL ERROR

Does a pelican feed her young with the blood from her breast? The heralds of old thought so, and many a coat of arms shows *a pelican in her piety* doing that very thing. It's a pretty legend but children nowadays demand facts. Here they see at close range exactly how the baby pelican gets its food, and it's every bit as interesting as the old story—with the added advantage of being true

Does a pelican feed her young with the blood from her breast? The heralds of old thought so, and many a coat of arms shows *a pelican in her piety* doing that very thing. It's a pretty legend but children nowadays demand facts. Here they see at close range exactly how the baby pelican gets its food, and it's every bit as interesting as the old story—with the added advantage of being true

WHAT BIRD IS THAT?

Brother may well ask the question and remember the answer, too, for it is the whooping crane, a rare species and almost extinct. They once ranged from Northern Mackenzie to Central Mexico. Before he and his sister grow up, these birds may have passsd with the great auk and passenger pigeon. But these specimens they are studying will be preserved for their children's children

THEY WANTED TO KNOW IF IT WAS REAL

It just didn't seem possible that any baby animal had a skin like that, but these doubting Thomases were convinced when they were invited to feel the bristly hairs on the rhinoceros' hide. And those tubular ears interested them, too. Can you think of any better way of teaching children the shape of a rhinoceros' ear than by letting them poke their fingers into it

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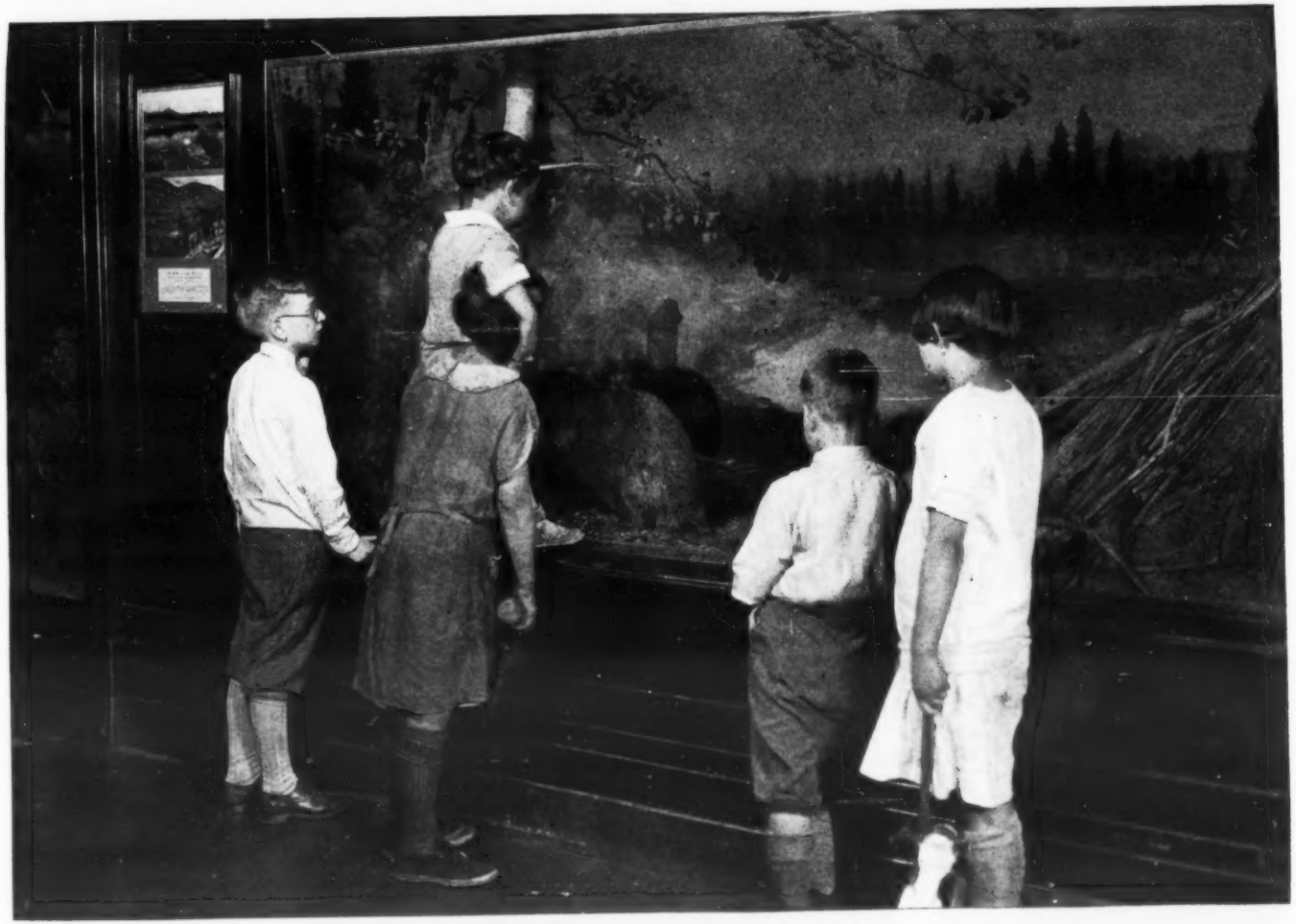
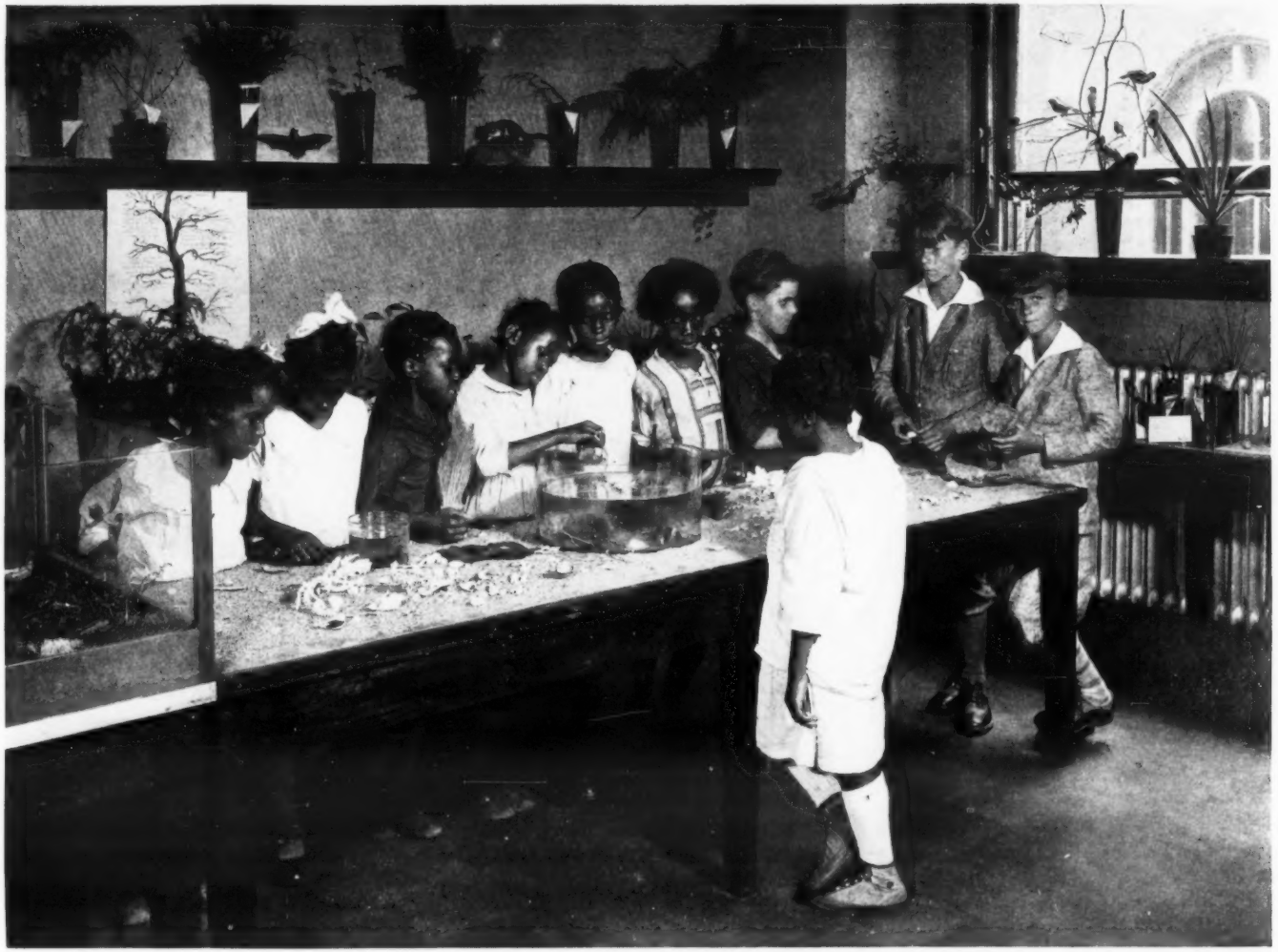


IF THESE WERE YOUR CHILDREN—

Wouldn't it be a relief to you to know that they had even temporarily abandoned their ball playing and roller skating, amid the traffic hazards of city streets, to spend a bit of their playtime seeing how the beavers build their dams and construct their houses? Four of the five children in this picture are almost daily visitors to the Museum



FROM EARTH AND SKY AND SEA

In this model School Nature League Room, maintained by the School Nature League, are living things that crawl and creep and fly and swim, plants that grow, and animals that snuggle softly into warm hands. It is seashore, woods, and mountain-top all brought within four walls for city children who could otherwise know little of the wonders of God's great out-of-doors

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SIGHTLESS EYES BUT SEEING FINGERS

The Museum offers opportunities for nature study even to those who can never see its exhibits. These blind children, only a few of the many similarly afflicted, who regularly attend Museum classes conducted for their benefit by members of the staff, gain their ideas of plant and animal life through the sense of touch supplemented by careful oral instruction

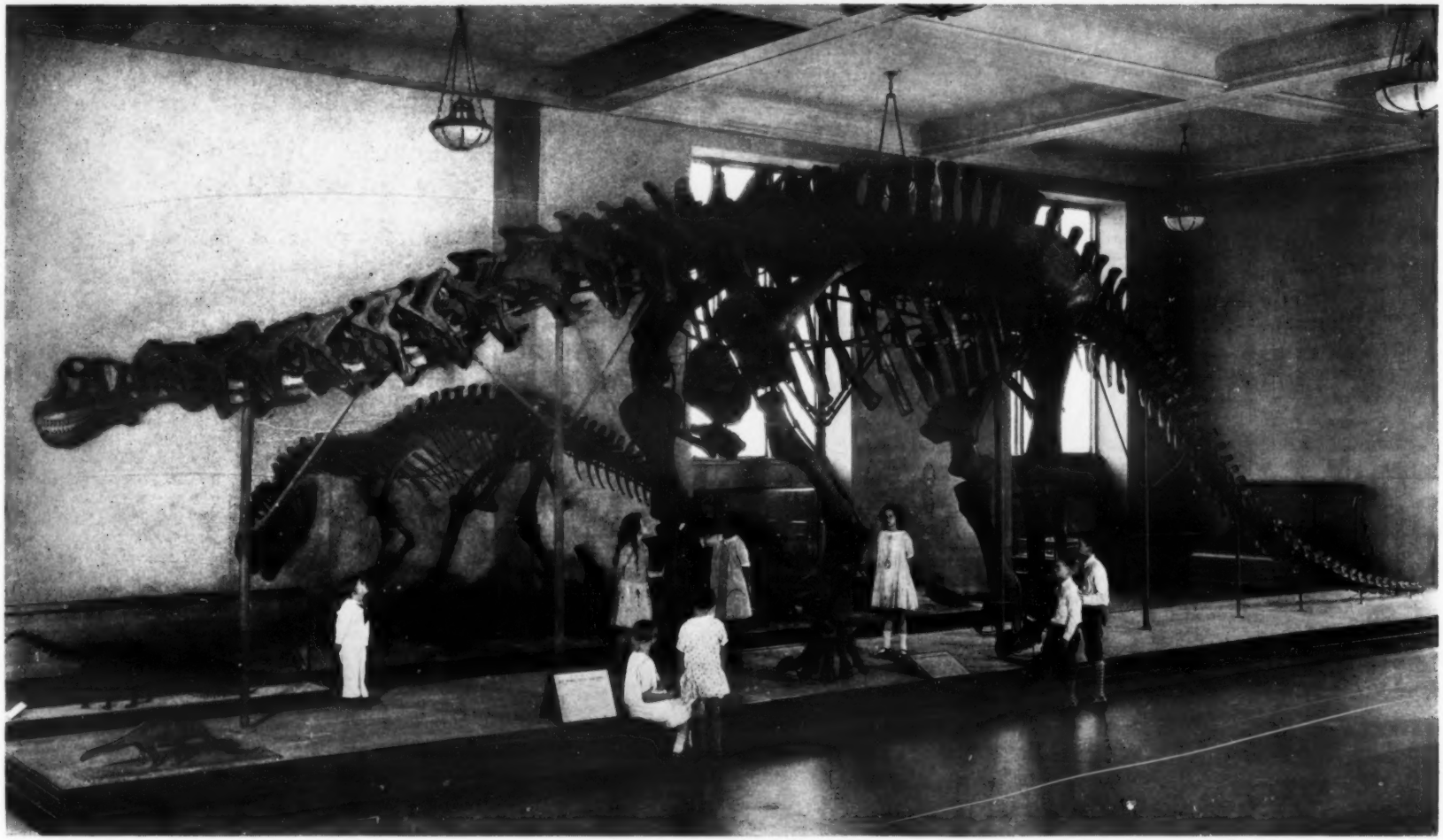
THE END OF A NATURE TRAIL

When you have followed the trail from case to case and noted the differences between the feet of the sandpipers and those of the woodpeckers, and the kind of bills that the flycatchers have and those of the seed-eating birds like the sparrows, it's nice to sit down with the leader and count up your score on the questionnaire

When you have finished the [illegible] bills that the flycatchers have and those of the seed-eating birds like the sparrows, it's nice to sit down with the leader and count up your score on the questionnaire

WHICH WILL STRIKE FIRST?

Will victory rest with fang or claw? Here are all the elements of drama—interest, fear, conflict—but the action is suspended. To complete the scenerio these youngsters will *want* to know more about bobcats and snakes



YOUTH AND AGE MEET

In the Dinosaur Hall the five-year-old can look back fifty million years, and marvel at the huge bones and empty skull of the Brontosaurus. These children already know more about this dinosaur than he ever knew about himself. Their education has begun——

In the Dinosaur Hall the five-year-old can look back fifty million years, and marvel at the huge bones and empty skull of the Brontosaurus. Their education has begun——

BUT CHILDREN WILL GROW UP

As high-school and college students, the boys and girls who used to visit the Museum for Nature Study or just to look at the queer animals, return. It is advanced zoölogy they're studying now. They come to supplement the meager illustrative material of classroom and laboratory with the wealth of specimens and the specialized instruction that the Museum offers

WHERE FLYING WINGS ARREST THE GAZE

The first glimpse of this dome in the Hall of Birds of the World is almost certain to draw forth an involuntary gasp of wonder. Nor is the first impression dulled upon closer acquaintance. Prolonged and contemplative observation reveals with what scientific accuracy even obscure details have been portrayed. Like many another corner of the Museum, it suggests further study to all who realize that no one has yet lived long enough to complete his education

The Museum as an Educational Interpreter

By PAUL B. MANN

Head of Department of Biology, Evander Childs High School, New York City, and Associate in Education in American Museum of Natural History

JUST off the lower Bowery is a triangular block comprising the heart of "Chinatown." Whatever the weather, there are always visitors, young and old, drawn by the lure of the exotic.

So much here is completely different: the baskets piled high with bamboo sprouts and tiny seedlings; the bottle-necked gourds and strange roots vying for room in the little shops with curious strings of dried foods,—fishes, mussels, squids, mushrooms, dark-brown ducks and geese, and occasionally a whole pig, also smoked and dried. If you buy an ancient blue jar (for its artistic quality, of course, rather than for the ginger you know it contains), and insist upon a receipt, you will see the almond-eyed proprietor use a little brush, held vertically, to produce the column of black, cabalistic figures, though he may bring you back to earth by reaching for a modern rubber stamp and a red stamp pad, as a more practical way of identifying his place of business. Each doorway and corner has its knot of jacketed orientals, eagerly discussing something vital to themselves, while black-haired and black-eyed children play the American games of ball and of marbles in the narrow streets. The flanking buildings so elbow these alleys that you feel more cramped than in some of Boston's or Nantucket's ancient lanes. The reddish signs, the Chinese bulletin boards, the yawning cellar openings and divergent stairways, all contribute to a realization that one is actually in foreign parts. The only drawback might be lack of a guide who could answer questions.

Just what is this spell of Chinatown? If you will analyze it, you will find that the attraction lies in the opportunity of actually seeing objects and people about whom you have read or heard. Curiosity and interest are two driving forces. When they can be linked up with constructive ideas and a program of education, you have gone far toward real achievement.

The museum idea is almost as old as civilization. Aristotle, according to Pliny, at one time had a thousand men collecting zoölogical and botanical specimens from Greece and Asia for his Lyceum, which was the first great zoölogical garden and museum the world had ever known. Would that modern patrons were as generous to museums as Alexander was to Aristotle, to whom he gave the present equivalent of $4,000,000 for physical and biological equipment and research! Ptolemy evidently was the first to use the word "museum," and this was in connection with the institution he founded at Alexandria.

Museums in general seem to have had their genesis in collections made by the rich for their own personal gratification and exhibitions. As science gradually developed, scholars and students began to bring together specimens and materials to aid their studies. Such private collections eventually grew into the public museums we know today.

The idea of educating the public, especially through close coöperation of museums with the public schools of their localities, is a comparatively

recent development and has great possibilities. Not only are practical aids thus made possible for the teacher who has the difficult problem of making teaching objective in a huge metropolis like New York City, but a sympathetic and appreciative attitude toward the museum is early developed in the youth of the schools.

How best to link up a great institution like the American Museum of Natural History with the tremendous quantitative needs of a million school children and their families, together with the vast floating population, is a complex problem calling for much more than mere exhibition!

If Chinatown can interest the adolescent and his parents, a similar impulsion must be possible from the varied departments of a great museum. The panorama here is crystallized and static; no cross-section of real life is going to parade in front of a case. For many, a visit to Chinatown may not be possible. At best its attractions are peculiarly local in interest. In the case of this Museum, whose expeditions reach every land, there is an almost unending display of treasures from all quarters of the world. These treasures are bound to create interest. But is this interest motivated in the fullest sense? Is it always linked up with constructive ideas? Having procured representative specimens and arranged them significantly in well-lighted cases with attendants in charge, has the Museum accomplished its mission?

Let us see. Who is coming to see these exhibits? Is it possible that the kind of visitors might determine the Museum's procedure, even to the point of devising ways and means of educating its guests to appreciate the types and kinds of displays? Is it possible to think that a museum might even modify its general aims because of its daily visitors? The average visitors are not scientists. School children, at least those studying biological science, are likely to know more than the layman about some of the extensive animal exhibits, but their knowledge at best is meager. Naturally, exhibits labeled by scientists will meet the needs of other scientists. But more and more the museum must meet the educational needs of its average visitor and fall in line with the new movement for adult education. Labels couched mostly in scientific terms can have no appeal to any but the trained scientist. The layman or schoolboy will see the animal or exhibit but he will not see relationships, sequences, economic importance, zoölogical cause and effect. He will do little or no real thinking, nor, for that matter, make any real observation. Mere looking is like mere hearing, which is far from *listening*. Every curator of every department of every public museum is on the defensive when it comes to the interpretation of his exhibits, so that the public shall get all they are entitled to.

As an example of what I mean, let me refer to an incident, which occurred recently. While working in Darwin Hall, I overheard a trio of visitors as they were making the rounds of that room. They saw all the specimens in the synoptic groups of animals, but their conversation showed that *Amœba proteus* and *Tænia solium* were not, for them, names to conjure with, nor good pegs, alone, on which to hang interesting ideas. Here were specimens typical of each division of the entire animal kingdom, but apparently these visitors got nothing much out of these exhibits. When they came to the glass mosquitoes and exhibits

showing struggle for existence, and even Mendel's Law worked out in plant and animal illustrations, they looked and looked, and discussed them eagerly. Would scientists lose any of the values which the synoptic series hold if more humanized labels were used to interpret these groups to the lay public? For instance, would not the public get a new appreciation of the federal efforts to safeguard meat through rigid inspection, if more phases of the life history of the tapeworm (*Tænia solium*) and trichina were exhibited and interpreted?

The next steps then are to evaluate thoroughly the impressions of the visitors; to study the curricular needs of the schools, and see to what extent the museum is supplying the right materials and help; to re-arrange exhibits wherever needed in order to show sequential, structural, and other relationships; to develop a new kind of guide or questionnaire which is informative and inspirational, and contains stimulating queries; to organize docentry service so that time may not be wasted and that pertinent knowledge may be acquired; in short to take the schools and the public into partnership.

It is only fair to the far-seeing director and other active officers of the American Museum to state that all the preceding program is being considered. Far from being an institution of mere exhibitions, the Museum is itself seeking to satisfy the growing needs of the schools as well as of a public becoming constantly more discerning.

Among the most recent aids for high schools are new lectures accompanied by lantern slides, which have been produced for the use of the teachers; a library of microscopic slides for elementary and advanced biology, assembled for distribution like lantern slides; live fruit-flies (*Drosophila*), furnished for breeding and Mendelian experiments; new insect habitat groups developed with elaborate keys and descriptive labels; bird guides and keys, rewritten and issued in the convenient nature study size; a traveling collection of fossils, built up to illustrate types of prehistoric animals and evolutionary development; mounted pictures of scientists and scientific institutions; and framed pictures, loaned for limited periods to schools for hanging in classrooms. In addition, the entire traveling collection of loan specimens, charts, and objects has been re-organized. As the result of suggestions from teachers, many special lantern slides have been made and added to stock. The last two items affect private institutions as well as public schools, both elementary and high, as does also the inspirational radiation from the new School Nature League room in the School Service Building at the Museum. No more than mention need be made here of the invaluable film library which is also free to the schools, and to which constant additions are being received. Teachers' organizations, such as the New York Association of Biology Teachers, have begun to utilize the superb facilities of the new rooms for evening meetings. With the opening of the new library, there will be additional reasons for enjoying the Museum.

The staff of the Museum's department of public education has been enlarged, particularly to meet the growing needs of teachers and pupils of New York City and vicinity. More expansion is already indicated.

One other new plan is of vital importance. A limited number of teach-

ers from the Training Schools of the city are to have a period of instruction in museum technique and methodology either at the American Museum or at the Children's Museum of Brooklyn. This training course for teachers was put into operation in a tentative way last spring, with excellent results. Such a program is bound to increase in value to teachers with continued experience and experiment.

Field expeditions have been for many years a prominent aim of the administrators of the American Museum. New lustre has thus been added to scientific research and the Museum itself enormously enriched. Many patrons have been interested in sponsoring these activities. The worth and productive value of such Museum expeditions have been fully demonstrated, and the Museum now asks for strong support and heartiest endorsement of its pioneer work as educational interpreter.

The Monarch Butterfly Group.—One of a series of small habitat groups showing the life history of different insects, for circulation in the public schools of New York City. These groups have been found especially useful in teaching biology

The Child Discovers His World

By RITA SCHERMAN
(Mrs. R. M. Berman)
Author of *A Mother's Letters to a Schoolmaster*

CHILDHOOD is a period of discovery. The young child's whole being, "like a large eye," is open to the impressions of the world about him and "wholly given up to them."[1]

Knowledge of things and doings—news of his surroundings—is being garnered by this discoverer, rapidly, constantly: forms, sounds, colors, identities, processes, activities, meanings, relationships of space, time, number, bulk, kind, relationships of people, with all the words which designate and represent all these things. The whole of Nature and of Art and Artifice await his discovery: Nature, the power, law, process, and substance of all being; Art and Artifice the ever-developing superstructure we know as civilization. What an immensity to take hold of and make his own!

As discoverer in this great world of unlearned happenings, a universe of innumerable visible actions and invisible relationships, the child needs a compass, and it is the attitudes and values of the grown persons about him that he takes as compass. These attitudes and values are reflected in schools, museums, curricula—institutions and systems that grown persons provide to educate the child, to lead him forth into life and knowledge.

How logically do these present life to the child and free him for ever larger discovery? Are the academic categories of knowledge, laid down centuries ago by scholasticism, fit pathways of education for the children of this era of world democracy? Can the discoverers find reliable guides to life in the catalogued subjects of school curricula and the stereotyped classifications of formal museum exhibits? Is there needed a more viable arrangement of the facts of human knowledge so that the discoverer, as he learns of the ways of nature and of human kind, may find his way intelligently and unconfused amongst all the concepts he garners? Does he not himself indicate through his own natural interests what the pathways of that new classification should be?

It is along the byways of aroused curiosity that the interests of childhood lie, along the little roadways of *needs*, in his day-by-day contacts with life, that the interests of the discoverer play. A child's inquisitiveness about the world lies primarily along the paths of the activities he observes about him, whether in the realm of human doings or in the mechanisms of objects he sees or handles; whether in the ways of beasts, birds, and insects, plants, sun, stars, and the weather, or in the intangible forces which do man's bidding in the wonders of modern invention. What things are for, what things are made of, what makes things go, and WHY—these are the pivots around which the learning of children naturally takes place.

To examine the discoverer's store of concepts gleaned in the first free years before "shades of the prison house" begin to close about the growing boy and girl, is to find that they cluster around the essential activities and experiences of life—Shelter or Home-Making, Food-Getting, Clothing and Adornment, Communication, Trans-

[1]Friedrich Froebel, *Education of Man*, p. 24

portation, Barter, Government or the Rules of Living, Play and the great Arts that have sprung therefrom. These are what make up living, no less for us than for our children. Around these is built up the pattern of all human activity. To maintain these—the elements of our human economy—we utilize the visible resources and the unseen forces of nature. These, throughout the ages, have been the natural needs which instinct has guided to development. They were the same when man's first concepts of his world and first articulations began to build up the body of primitive knowledge, and the complex knowledges of today's civilization are still woven inevitably around them.

Would it not appear needful, then, at this stage of progress in human development, and in the interests of a scientific and logical approach to learning, that education make a restatement of knowledge in terms of *needs*, in terms of the basic activities and everyday experiences of humankind? It is obvious that man's comprehension of his environment and of the interrelationships of life-processes will proceed more readily when the approaches to learning are made thus logical and scientific—brought into accord with the psychology of learning itself. The academic subjects which have served for generations to introduce man to knowledge are doors which do not *lead forth*—this being the true sense of the word education—but which *lead away* from natural interest, from the identification of the self, "in desire, effort and thought," with "objective subject-matter."[1]

Knowledge, whether in schools or museums, should be presented to the child in a dynamic unfoldment, as news growing out of the thing his thought is engaged with at the moment, as a pageant of development which he may follow back or trace forward, from the tool he holds in his hand, the engine he fascinatedly watches, the coin he carries in his pocket, to the dawn of pre-history, if he will, or to the far reaches of the unseen and infinite where often, if we let them be, the thoughts of little children steal back from whence they come, "not in entire forgetfulness, . . . but trailing clouds of glory . . . from God which is their home."

The ideal school, the ideal museum, the ideal curriculum will present to the child means by which he may orientate himself in the complex civilization of which he is inheritor. That which we present to him should be an exposition of knowledge and achievement, a survey of experience, an index to his world, and this cannot be done in terms of the school subjects, but needs elucidation in terms of familiar everyday doings made fascinating by the drama of growth. Each activity becomes thus a pageant marching down the ages,—the pageant of Home-Making; of Clothing and Adornment; of Sustenance or the drama of Food-Getting; of Transportation—the evolution of Means of Travel; of Communication—how men exchange their thoughts and record their experiences; of Barter—how men exchange the products of their skill; of Government—how men agree to live and behave in orderly fashion. And so on.

A concept of education as individual discovery offers, in all avenues of activity and information for the child—in schools, museums, motion-pictures, and books—fascinating possibilities for illuminating the pathway of the discoverer. Within the past

[1]John Dewey, *Interest and Effort in Education*, p. 90

decade, in many parts of the world, schools have sprung into being which have challenged the lockstep in education, and their demands will doubtless eventuate in the appearance of books, motion-pictures, maps, and charts which will more and more humanize knowledge, take it out of the pigeon holes of the formal subjects and redistribute it along lines that hew closer to the realities of everyday life.

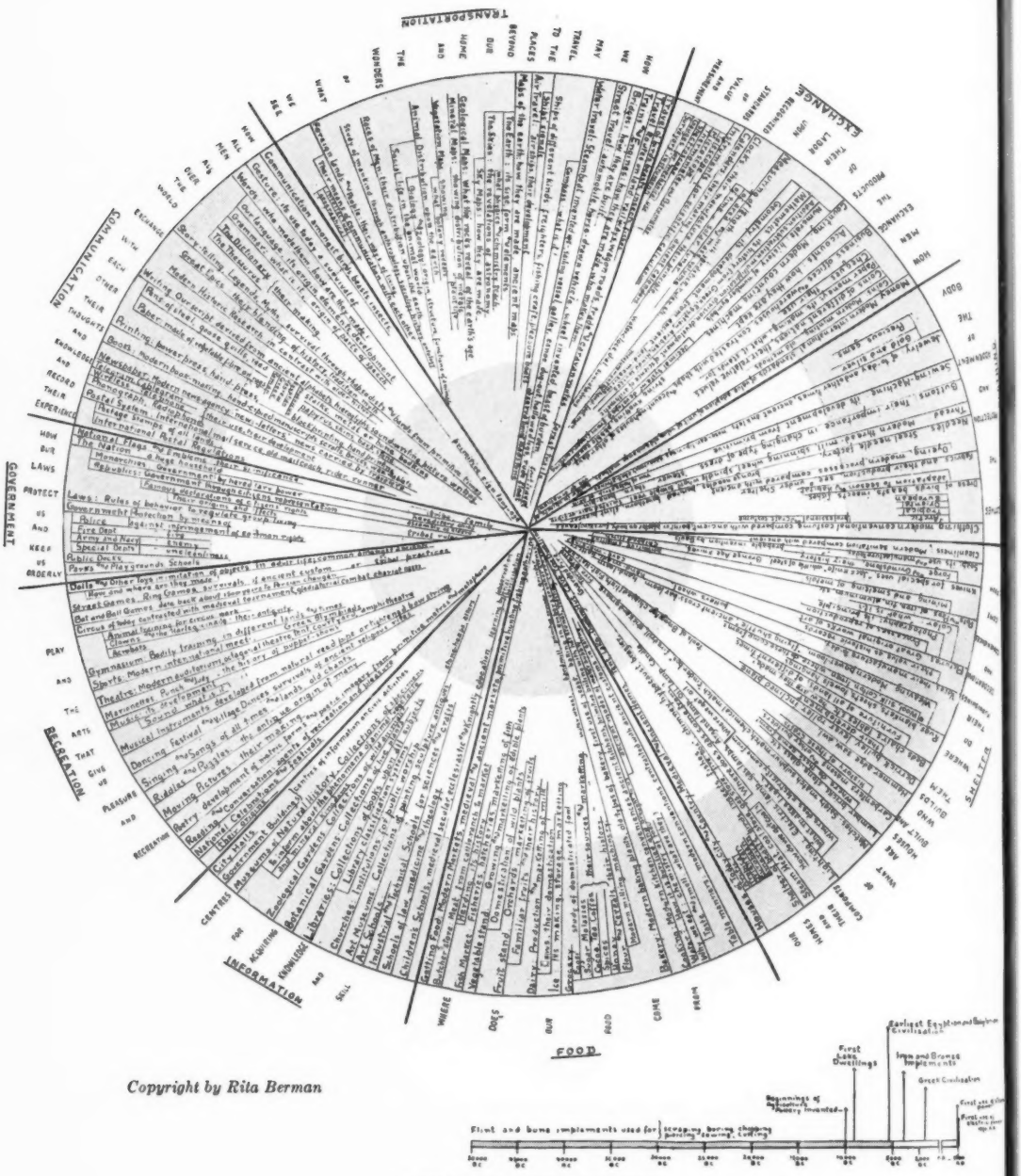
Museums must meet this challenge too, and they are beginning to do so. In many places developmental exhibits have been installed, the interest in which, amongst adults as well as children, indicates the value of a much more extended re-arrangement of specimens, relics, and models. The great need is a correlation of exhibits such as will not alone make clear the relation of the past experience and products of the race to familiar aspects of present-day life, but will also demonstrate the interdependence of plant-, insect-, bird- and human life.

What man finds on the earth, and *what man does with what he finds*—these two lines of inquiry present a basis for the correlation of museum exhibits in terms of familiar needs. Illuminating facts from amongst all the pigeon holes, particularly those labeled natural history, anthropology and sociology, should be called upon to build up these exhibits. The child, discoverer of today's world, finds the bulk of what man, the discoverer of a half million years ago, found then. Wonder of day and night, sun and moon, stars and seasons, fruit and flowers,—things whose appearance is directed by powers unseen; ways of beast, bird, fish, insect, man, all manifesting common peculiarities; power of communication, each with its kind; kindred needs of food and shelter; definite forms of group or social organization, more or less marked until they reach the degree of co-operative activity of the bird-family, the bee, the ant, the human being.

The fundamental life-experiences of mankind are plainly paralleled, as has been suggested here and there on the accompanying chart, in the life-histories of beast, bird, fish, and insect, and if we go back far enough into the history of human life we see how closely they were allied in method in the beginning. There is, however, this great dramatic contrast: ways of living amongst the lesser creatures have been unchanged, we suppose, from the beginning of time, but ways of living amongst men have varied and changed from primitive times and still continue to change. Man's ever-increasing command of earth's resources has given his achievements an evolutionary character.

The discovery of *what man finds on the earth* acquaints the child with the essential nature of things, and gradually, sooner or later, leads him to an apprehension of the Science of being. How soon or how late, depends upon the clarity with which his discoveries are interpreted to him. The discovery of *what man can do and does do with what he finds*, leads him into the realm of Art and Artifice, in which imagination and intellectual activity bring him creative joy.

The facts of Science, Art, and Artifice, seen in this perspective, indeed belittle the traditional subjects either as starting points of learning in the schools, or as bases of classification of museum relics and models. Grown-ups who see thus, and ponder what they see, know that they can let go of formal subjects, formal periods of instruction and formal exhibits, and follow the needs of the child as his interests reveal them.



A CHART OF CIVILIZATION

(ABRIDGED)

An Index to and Survey of Human Experience upon which to base a reclassification of knowledge, a rational curriculum for public education, as well as a library of educational motion pictures, a children's encyclopedia, and a children's museum (static or traveling).

The scale indicates the duration of time represented by the radiating lines on the chart. Of the 50,000 years of man's experience indicated, the innermost circle represents 45,000 years and more. The white circle represents about 5,000 and the shaded outermost circle represents the last 100 years.

The earliest rough stone implements discovered are estimated to be 500,000 years old. It would take a scale extended many feet to the left of the one shown here, to illustrate the remoteness of that period.

Note the amazing rate of man's material progress in the last 100 years, which span so small a portion of this time-line that they can be represented only by a mere stroke at the right-hand end.

This chart is reproduced from the one used by the author in her book *A Mother's Letters to a Schoolmaster*

Long before the formal school age does the child begin to map out his own curriculum as he reaches out to the grown-ups about him for aids in his investigations of life and things. "Where to do the moon go"? asks my little boy. "Is the moon the daddy star"? And your little girl says: "Is it far to the end of the sky"? or "Why do not things fall up? . . . Where does the wind go? . . . Will the days that have gone come back again? . . . What is the last number there is? Where do colors come from"? Always thus something lifts itself up to the vision of the discoverer out of contemplative moods. A grown-up who is a reliable compass encourages the discoverer to ponder and investigate what lifts itself up, and to give each new concept a *place* in the order of wonders already revealed.

The degree to which this encouragement is given in the very early years of childhood determines to a large extent the receptivity and eagerness and freedom with which the older child acquires knowledge. Habits of contemplative thinking, and investigative and organizing tendencies can be encouraged or inhibited just as positively as habits of bodily skill or desirable behavior. Homes, schools, museums, the theater, and every avenue through which the child gains direction in his living, should organize the elements of that direction in ways to stimulate and encourage reflective thought. Such ways will lead far afield from the docketed knowledges that have up to now mapped out the pathway of learning for children young and old.

And besides revealing his world to the discoverer as a place of ever-recurring wonder, a place of constant growing and marvelous organization, a place of beautifully interrelated life-processes, schools and museums should show it to be a place of *sharing*, with development and survival dependent, indeed, on the very principle of sharing. Just as amongst the lower creatures survival and multiplication of such sharing beasts and fowl as the cow, sheep, and hen are undeniably assured, so the artifices of men survive and develop in proportion to their sharing qualities. The implements and devices of utility discovered or invented by primitive man have evolved to forms suited to modern needs, whilst instruments of torture and cruelty have disappeared and will continue to disappear until they are as extinct as the predacious animals which have vanished from the face of the earth.

From the point of view of the accompanying Chart of Civilization which pictures these ideas, Nature appears not as one isolated subject in the curriculum, not as a separate compartment of study, but practically as *the* curriculum. It is synonymous with Life, the wholeness of experience, and the ways and doings of human beings are part of that experience. Nature and natural history become thus names for the expression of an infinitely varied activity of intelligence, and the proud achievements of men—the vitaphone or Woolworth Building, for instance, —are seen as reflecting not a different intelligence from that which fashions the bird's nest or the beavers' dam, but as inevitable responses to more complex needs. As educative agencies become more and more conscious of that unfolding intelligence, they will confidently open pathways along which children may move forward to discover, let us hope, a fairer, freer, kindlier, and more peaceful world.

Photograph by Clyde Fisher

CAN HE SHOOT HIS QUILLS?

Photograph by Clyde Fisher

WHAT CAN TAKE THE PLACE OF NATURE IN EDUCATION?

Education as Natural Development

By MARIETTA JOHNSON

Director of the School of Organic Education, Fairhope, Alabama

TODAY, at Fairhope, Alabama, the School of Organic Education occupies nine school buildings and a campus of ten acres. The pupils vary from kindergarten to college age. Twenty years ago this school had its inception in a little cottage where six children were enrolled. During these years of growth and progress, it has succeeded in its original purpose of providing a school program which would minister to the health of the spirit, mind, and body of the growing child. Throughout these years it has been supported mainly by volunteer contributions largely solicited by the director. That the school might be of value for public education, no tuition is charged the children of the town. A boarding department has been developed through which the school may become partly self-supporting.

Believing that education is life and growth, the school concerns itself primarily with the child's spiritual or emotional life. The stimulus for growth is interest. There are aims and purposes in life itself. Persevering, enduring, and concentrating for objectives in which he has absorbing interest, are the finest disciplinary experiences for a child. Submerging the personal desire or caprice to conditions inherent in the situation is the highest form of discipline, and this is attained in all creative work. In order to furnish the best environment for the development of sincerity, joyousness, and un-self-consciousness, all formal work is postponed until children are eight, nine, or ten years of age, and creative hand-work is used in its stead. There are no desks to interfere with the freedom of movement; there are no intellectual tasks or assignments; no external goal to be reached, and all marks and grades are omitted. Music and dancing are provided in full measure; the story hour is made enjoyable.

As the children grow older, they begin to make use of books and figures. Still there is no assignment of tasks. The freshness of intellectual attack is preserved for the time when the child's mind is really awakened. It is insulting to ask the child a question to see if he can answer. He should never be questioned except to help him understand. In working out projects the child learns to wait for data before making decisions. He forms the habit of taking truth *for* authority instead of

truth *on* authority. This is fundamental to intellectual integrity.

The children are grouped according to their chronological age, and the teacher provides each group with the things necessary for health and study. Special individual attention is given where it is needed, and cases of trifling or indifference become special problems for the teacher. The intellectual development of the child should be as un-self-conscious and un-striven-for as spiritual or physical growth. The prolonging of childhood is the hope of the race. No child should be accelerated. The gifted or precocious child simply should be given more work to do rather than be placed with older children. Placing twelve-and thirteen-year-old children with those of more mature years often results in real tragedy, for sex and social consciousness is forced when this is done. For true health and normal growth, co-education is absolutely necessary. A balanced attraction during the growing years is imperative.

After the children have learned to read, write, and use figures, they take up history, literature, geography, and arithmetic. The creative hand-work, music, and dancing continue.

At fourteen years of age the pupils enter the high schools, not because of any special preparation, but because they are now youth and require a different process. Here four years are spent on earnest, serious work in science, literature, history, mathematics, and language. More advanced creative hand-work in the shop and gardens, and cooking, sewing, music, and dancing supplement these studies. Even in the high school there are no tests or examinations. No child should know failure. No child should develop an inferiority complex. The growing edge must be kept keen through interest, and the order of the development of the nervous system must be respected. After four years of high school work, the pupil automatically graduates. Our graduates have entered many institutions of higher learning and have done well.

Society owes to the young, throughout the growing years, guidance, control, instruction, association, and inspiration. The fundamental condition of growth for the adolescent is social. Some day there will be a college in which the required studies will be music, dancing, dramatics, and arts and crafts. When an investigation is made of the extra curricula activities in our colleges, I venture to say that these will be found to have more educational value than much of the work of the classrooms. The fundamental, all-inclusive art is the art of human relations. Every opportunity and assistance should be given the young to grow in it.

The question all along the way is "What is needed to produce a sound, accomplished, beautiful body, an intelligent, sympathetic mind, and a sweet, sincere spirit"? In the measure that the school provides conditons which produce these, is it educational.

Photograph by Clyde Fisher

HAPPY JACK'S FAVORITE FOOD

Photograph by Clyde Fisher

OOH! ISN'T HE WARM?
(A Florida gopher)

Photograph by Clyde Fisher

WHO'S AFRAID OF A 'POSSUM?

Photograph by Clyde Fisher

CATCHING SAND FLEAS ON THE BEACH
How they can hop!

Step into the little gardens and you will find busy groups of children learning about soils and seeds and slips

Nature Study on the Lower East Side

By MARGARET KNOX
Principal of Public School 15, Manhattan

NOT long ago there were gathered in the dining room of one of New York's big hotels nearly 800 men and women, most of whom were teachers in our city schools. They had come in this social way to dine together and to talk about Nature Study and the School Gardens of our Public Schools.

This gathering was under the auspices of the School Garden Association of New York City which has for its motto, "A Garden for Every Child," and in the program prepared for that day there were items interesting enough to set the whole world a-thinking.

One page of the program is devoted to the activities of the School Garden Association which has a membership of about 8,000 men and women. Here are some of its activities itemized: A Nature Garden Center which exhibits a nature library, a class museum, and window garden demonstration for teachers; publication of the Nature Garden Guide, a small four-page leaflet issued for the instruction of members of the School Garden Association in all matters relating to nature work in the schoolroom, or in the school and home gardens; exhibitions in public schools of bulb raising, seed planting and growing, flower shows, and nature teaching.

Then we come to a page in this nature program headed "Some Nature-Garden High Spots" and we read such interesting items as these:

Classroom gardens in schools	16,256
Bulbs purchased in public schools in 1926	230,270
Narcissus shows in schools, December, 1926	270
Nature rooms in schools	81
Classroom nature projects carried on	99
Pupils voting for a school tree	333,205

These are a few of the statistics that make us stop, look, and listen for the signal that is to direct us along the right road in our educational journey with our children.

The figures in themselves are cold. They tell nothing of the warm, pulsating love of nature that was throbbing in the hearts of hundreds of teachers and thousands of children while these figures were piling up. They cannot take you into the dark old school buildings where these projects have been worked out by an enthusiastic teacher who loves to lead her class out from the harsh, unattractive materialism of the environment in which the children live, to bask in the warmth and sunshine of Nature and God's out-of-doors.

Will you come with me on a Nature Trail more fascinating than any you may have taken in solitude or with one or two friends as you opened up and marked out your way through quiet beautiful woods, over hill and dale, and by the banks of rushing streams?

Down on the lower East Side of our great city of New York, surrounded by tall, dingy tenement houses, bounded by streets swarming with pushcarts and vendors of all kinds of things from second-hand kitchen utensils to fur coats, from vegetables and fruit to live fish and chickens, stands an old gray building, Public School 15, Manhattan. It has stood there for nearly one hundred years, ever since this East Side Ghetto was one of the fine residential sections of Old New York. When I say that most of the 2200 boys and girls now attending this school live within a radius of two square blocks, and that of their 4400 parents fewer than 100 were born in America, you can easily judge of the congested condition down here and of the great foreign population that is to be welded into America's strength.

We enter the playground of the schoolhouse. Bright pictures adorn the walls. Ferns are on the window sills. The door at the rear is opened and a flash of color meets the eye. Draw nearer. In a little garden, not much bigger than a handkerchief, banked by a five-story tenement on one side and our own dingy school on the other, are blooming daffodils, hyacinths, crocuses, tulips. They are carefully guarded by monitors from the industrial classes. These are the children who do not succeed in getting high ratings in academic lessons but who are ever ready to dig and plant and water the garden. Here stands a foreign mother, tears streaming down her cheeks, looking lovingly and longingly at the flowers. She has come in to meet her little girl just entered into the kindergarten. Thoughts of her little country home in Hungary flood her mind, and she feels a pang of homesickness as she points out to her child the flowers that she knew in the old country.

Let me describe "Bulb Day" in this school. On a bright day in October in a corner of this little garden you will find a beehive of busy children working. They have put up a table on trestles, and on it they have baskets of bulbs, of soil and sand, of fertilizer and of pebbles. The children of the industrial classes have prepared this garden spot so that they may sell to hundreds of children bulbs and proper soil to set them in. It has been fun to do all this preparatory work of mixing and sifting and selecting the proper ingredients for bulb raising, under the direction of their teacher, and when the sale begins these boys and girls act like veteran gardeners giving advice to their young patrons.

From all parts of this dingy old building come the classes in orderly lines, each child bringing with him his flower pot, or old bowl, or pipkin

thrown out by mother because it was cracked, but just the right thing for the planting of a healthy bulb, and in his tiny hand a few pennies to pay for bulb and soil. The line of children passes in front of the table, and behind the table the trowels are busy filling the receptacles with soil and dispensing the bulbs.

Then back to the classroom go forty children all intent on planting each his own bulb, and placing it in the darkness of the coat closet, there to stay until teacher decides that they are to be brought out into the light.

And so these lessons in nature, real live nature, go on from day to day, until at length the climax,—in January when our great day comes, Graduation Day, and there in our assembly hall are placed dozens of lovely blooms of the narcissus bulbs. These, raised by the children themselves, are the most beautiful of all our decorations that happy day.

In the spring season the hearts of the children are made glad by the procession of early spring flowers raised from bulbs of their own planting: snowdrops, crocuses, daffodils, jonquils, hyacinths, and tulips follow one another in rapid succession, filling the air with their spring fragrance and delighting the eye with their beauty.

What a difference this sort of nature study makes in the lives of these little ones who, when asked some years ago by the teacher, "What are the signs of spring?" answered without a moment's hesitation, "Putting the swing doors on the beer saloons," or, "The cat lies out on the back fence trying to get the sun to shine on her."

Here are some of the answers given in a nature English composition lesson, when the subject assigned was "The Signs of Spring."

Spring is here! Spring is here!
Let us give a great big cheer!
Daffodils dancing on the window-sills,
In the yellow sun!
Mother Nature greets us here,
Spring is here! Spring is here!
Come, come, let us sing,
Let us tell the birds it's spring!

And this one by a little 6B girl:

Awake! Awake! the voice of Spring
Says to the birds, "Awake and sing,"
And all the flowers beneath the earth
Are full of mirth! Are full of mirth!
See! how the flowers peep up from
their beds,
Up from the earth come their
tiny heads,
Throughout the world the voices ring,
The voice of Spring! The voice
of Spring!

The School Garden Association and the School Nature League founded by teachers who loved nature themselves and who wanted all children, even those condemned to live away from woods and fields and gardens, to get a chance to know the flowers, the trees, and the birds, have been pioneers in teaching us how to teach our course of study in nature, and in making real to the children this whole beautiful subject. These organizations mean bringing to thousands of children who have no opportunity to go out into the woods and fields and along the open road, by the side of streams and ponds, a knowledge of God's nature children: the birds and butterflies, the flowers and trees. They mean awakening in the minds and hearts of thousands of children a love of nature and a great interest in the study of nature things.

Look into the school buildings all over the city today. You will find window gardens in all the rooms, with eager children watching and nurturing the bulbs or seedlings that they themselves have planted. Step into the little gardens and you will find busy

NURTURING THE BULBS AND SEEDLINGS

Narcissus, hyacinth, crocus, and daffodil blossoms poke their heads above the soil and speak to the children with their fragrance and beauty

groups of children learning about soils and seeds and slips. By and by you will see the window gardens blossoming, not only in the school but in the homes too, as the narcissus, the hyacinth, the crocus, and daffodil blossoms poke their heads above the soil and speak to the children with their fragrance and beauty. And you must not forget to visit one of the most interesting places in this big school of mine. It is the Nature Room. This is the place where the child gets an opportunity to ask the questions that will lead him out into the open. Every school should have a fully equipped Nature Room where children can browse awhile every day and get near to nature's heart. It is just as necessary for the complete instruction of our children as is the Geography Room with its maps and globes and atlases, or the Sewing Room with its machines and needles and thimbles, or the Shop with its benches and tools.

Let me quote here a composition written by a seventh year child:

OUR NATURE ROOM

My! It certainly does seem as if Mother Nature loves Public School 15, for she has come to stay and is living in our Nature Room. It would take a year and a day to explain everything in it, but I shall try in the best way. We have two rooms, a larger one and a smaller one, which open into each other. The larger one contains nests of birds, a live canary, a guinea pig, a rabbit, alligator, goldfish. There are also the stuffed owl, who looks very wise indeed, a porcupine, a wild-cat, a fox, a squirrel, and stuffed birds. The smaller room contains specimens of lichen, weeds, shells, minerals, skins of alligators, pictures of birds, animals, minerals, and a cotton field. To make a long story short, I think Public School 15's Nature Room is one of the most interesting rooms in the district, and as I have said before, I certainly do think Mother Nature loves our school, don't you?

Nature study needs objective illustration more than any other subject in our curriculum. Without it, reading and literature become dull and meaningless. The Nature Room should make real O. W. Holmes's "Chambered Nautilus," Maltbie Babcock's "Surprise," Swinburne's "White Butterflies," Frances Hodgson Burnett's "Secret Garden," Wordsworth's "Daffodils," Bryant's "Fringed Gentian," Grahame's "Wind in the Willows."

Making connections with rural schools that have enthusiastic, interested teachers, is another very important part of the nature work in our schools.

Some years ago our school got into communication with a country school in Dutchess County quite out of the way in a small village. We asked them to send us flowers and twigs and branches and nests—anything in the line of nature material that city children living in a crowded tenement district would not be likely to see, and in a short time boxes and barrels began to come cityward filled with all sorts of nature treasures: birds' nests, hornets' nests, wasps' nests, evergreen branches, —spruce and hemlock—pine cones, and all the flowers in their season.

The excitement of our children at the opening of these nature boxes was quite thrilling, and the knowledge that both teachers and children gained from the study of their contents was surprising.

Then came the next important step in this interesting correspondence. The city children were kept busy sending letters of thanks to the country children —a fine way to teach letter writing. They wrote compositions descriptive of the material they had received or they asked questions about the different things, all of which exercises gave them experience in writing upon interesting topics and gaining definite knowledge of nature facts.

NURTURING THE BULBS AND SEEDLINGS
Narcissus, hyacinth, crocus, and daffodil blossoms poke their heads above the soil and speak to the children with their fragrance and beauty

In the drawing department the teachers made use of the nature specimens for lessons in drawing, painting, and designing, with very good results.

Samples of all the work of the city children were sent to the rural school and very soon the teacher of the country school sent us word of the fine effect this had upon the work of the country children. They became very much interested in all the work of the city children and tried to excel in all the branches.

Let me quote one of the compositions written by a third year boy, nine years old:

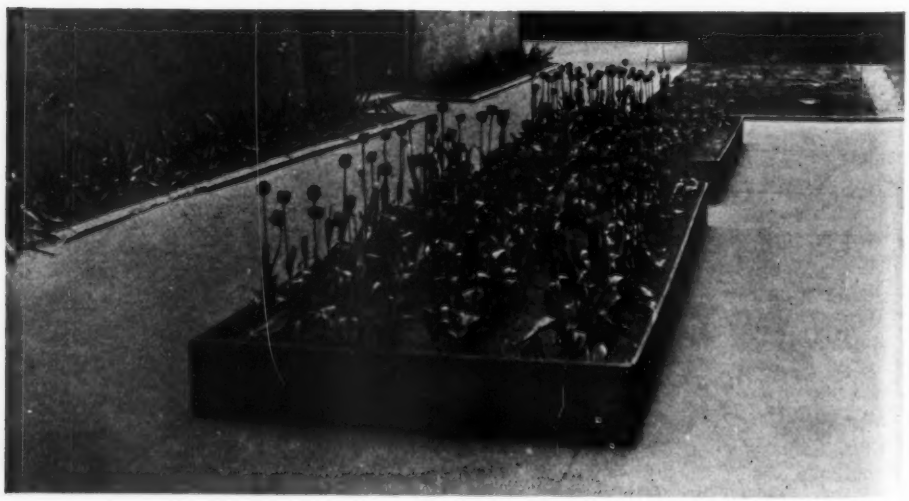
There is a caterpillar in the woods. It will soon become a butterfly on account of the magic change period. God is the magician. He always changes ugly things into something lovely. So he will change the little brown caterpillar into a marvelous butterfly. The butterfly will have two handsome brownish red wings to spread in the summer air. It will flit around and sip every flower's honey. It will be happy all summer until winter comes and then it dies. Wasn't that a wonderful change?

I have taken you along a Nature Trail blazed for the children of the crowded neighborhoods of a great city, and I have tried to show you that we place the study of nature very high in the curriculum. We want to train our children today to love the sciences that lead them out into the open places of this great, beautiful, wonderful world, and that influence each child to seek his life far from the "busy haunts of men."

We need farmers, foresters, gardeners, horticulturists, ornithologists, and astronomers. Why not find them among the children who have spent their early days far from the woods and fields, and lakes and streams?

Nature study in the schoolroom leads the child in spirit into the open, to live in the fields under the stars, in the woods, and by the sea, and to read the mysteries of Creation in God's great book of nature.

We need this sort of training for all the children of America.



School garden, Public School 15, Manhattan. The hearts of the children are made glad by the procession of early spring flowers raised from bulbs of their own planting

The Still-open Road

By FRANK E. LUTZ

Curator of Insect Life and Research Associate in Outdoor Education, American Museum of Natural History

IN a recent number of *Harper's* Charles Merz sang "a song of the once-open road" and its "one hundred and ninety thousand cars, forever flitting from one filling station to another, with half a million people on their backs."

I, too, have been in that "vast company of motors" and have had "impressions of a never-ending road, a thousand farms, no-parking signs, successive towns passed through at twenty miles an hour, back-axles of no end of cars." But, the road is "closed" only in the minds of those whose eyes see nothing but their speedometers, and because our various governmental bodies have not yet fully caught a vision of the real usefulness of public parks.

"Twilight in September," Mr. Merz truly sketches a part of the picture. "Over the hills winds the caravan: lunches gone, lights twinkling, tonneaus full of goldenrod. America revisited."

Let me give you a different picture.

Twilight in September. A car parked beside the winding caravan or left in a garage; on a hill stands a motorist "afoot and light-hearted"; lunch forgotten; twinkling flash-light playing on a goldenrod where a long-horned grasshopper fiddles a merry tune with its wings; mind and soul full of the joy of out-of-doors. America not only visited but made his own.

Like so many good things, the automobile is a curse or a blessing depending on the way we use it. Fate having been kind to me, I had occasionally gone by train to our West. How often did I wish that I could stop the train so that I might for even a few minutes listen to a bird which I had glimpsed through the car-window, or smell the fragrance of a clump of flowers, or take a short stroll along the brook-side! Then Fate was still more kind, for I motored to Colorado and those joys were mine. All summer that automobile of plebeian make was my home and my helper, not my master. A cañon twenty miles away,—in an hour I was there, and at the end of a perfect day my house was by the side of the road or, if I pleased, it was my helper to take me elsewhere for the night. No. The road is still open.

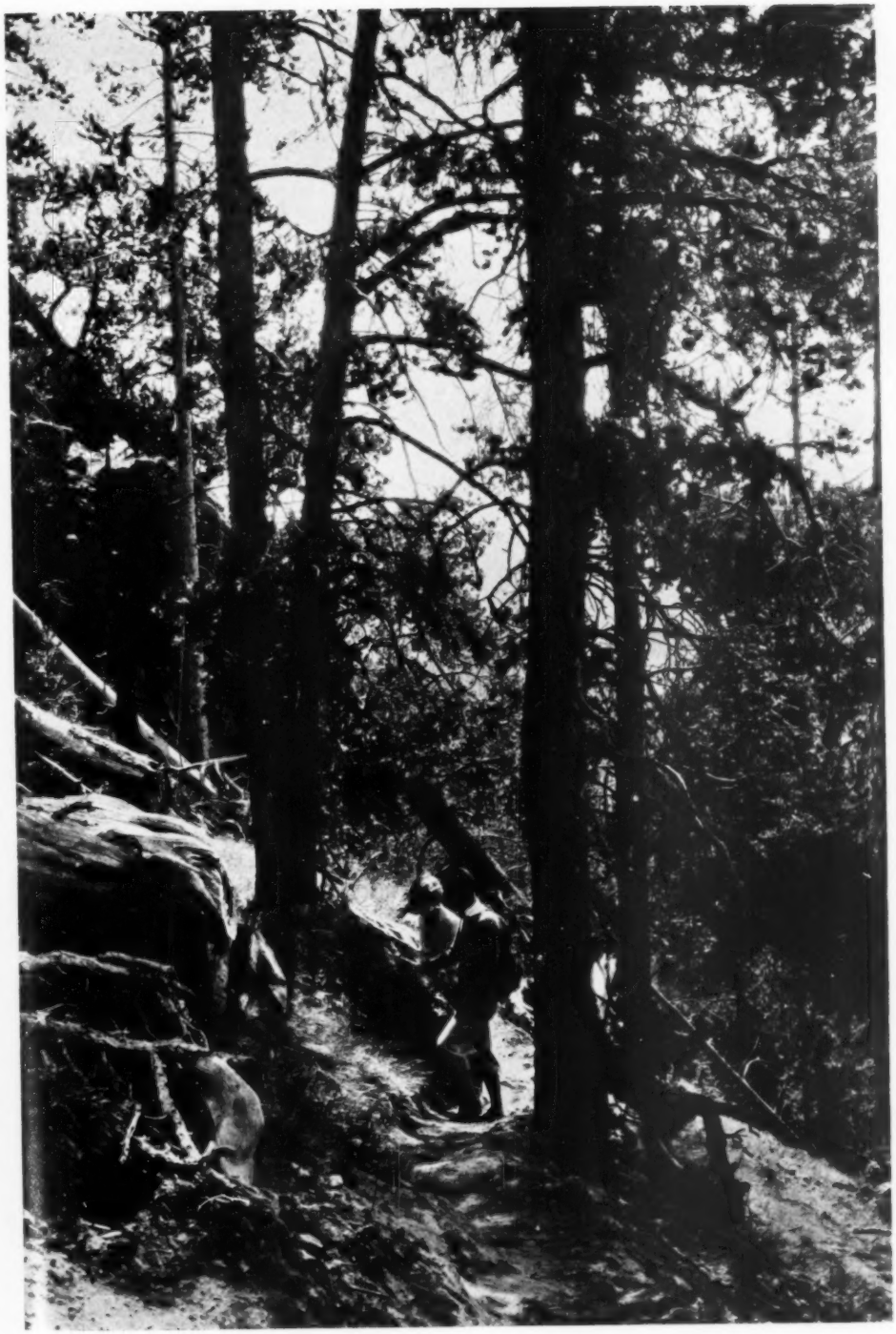
But not in the East, do you say? If not, that is the East's fault. Would that the East had more automobile tourist camps so that it would not be necessary "to hurry half the day for the apparent purpose of arriving at a point far enough away to make it necessary to turn at once and hurry home" because near that point there is no place in which a nature-lover can spend the night out of doors as he would like to do! It is not far from true that, quoting Merz again, "a family of six will drive two hundred miles to bring home three balls of glass with imitation butterflies inside," but it should be on the conscience of some of us that no one of this family appreciates the beauty of a live butterfly flitting from flower to flower.

It is highly desirable and is rapidly becoming essential that there be near every city of at least moderate size a tract of public land that is kept in as nearly natural condition as possible.

[1]The accompanying photographs of Yellowstone National Park's very successful Nature Trail were taken by Mr. Ansell Hall of the U. S. National Park Service.

ENTRANCE TO OLD FAITHFUL NATURE TRAIL, YELLOWSTONE NATIONAL PARK

The sign at the left gives an introduction to the Nature Trail similar to Doctor Lutz's "The Spirit of the Nature Trail." On the back of this sign, where it can be seen by persons leaving the Nature Trail, is information telling visitors of the other two important trails in this region. In the enclosure just beyond the log bridge is a very rare moon-wort fern (*Botrychium*)



EIGHT KINDS OF LICHENS ARE FOUND ON THIS SHADED ROCK ON OLD FAITHFUL NATURE TRAIL, YELLOWSTONE NATIONAL PARK

SMALL RUSTIC SIGNS ASKING VISITORS TO HELP PROTECT THE FLOWERS ARE HUNG OVER YELLOWSTONE TRAILS

We find it is much more effective to enlist the coöperation of visitors than to attempt to prohibit the picking of flowers

Large National Parks are fine but we need more State Parks and we need, badly need, County Parks—not merely country clubs for the public where those who wish may play golf or tennis or may swim or may eat a picnic lunch, although each of these things is or may be good, but real samples of God's out-of-doors that you and I and our butcher and baker may learn to appreciate and love and, because we do appreciate and love them, to protect.

There is one of the difficulties, not insurmountable but real. Who is to teach and how is it to be done?

Recently I was one of those attending the President's National Conference on Out-door Recreation who were amused by the wit of a representative of the Department of Commerce and Labor. He expressed approval of refuges for blue jays but pleaded for parks where "blue jeans" might rest. The point is well taken but we should do more. The finest radio set in the world would be no more than a parlor ornament if we did not know how to use it; and, to those who know, an open space is not merely a chance to breathe fresh air and to stretch out on the grass. It is Nature, even though it be but a vacant lot; it is much more of Nature if it be a bit of natural woods and fields; and Nature becomes a part of and fills out our lives if some friend introduces us to her and we become really acquainted.

A few years ago the slogan of our National Parks was "Our National Playgrounds" and that was good, for play is important. Now the policy of our National Parks has become in part educational, with Yosemite and Yellowstone apparently taking the lead, and that is fine. No grander, no more inspiring, no more instructive exhibits can be imagined than those in the great out-door museums, our National Parks. The exhibits merely need labels telling about them in language that everyone can understand.

But, if National Parks, why not State Parks; and, so that all of us, even the "blue jeans," may go at any time, why not County Parks? The hills in a County Park may not be mountains but, still, they were fashioned by the same forces; the trees may not be so large and so numerous but their stories are just as fascinating; the birds are just as beautiful and sing as sweetly; and, once you learn to know him, a chipmunk is as interesting as an elk and much more approachable.

Whitman sang of "the open road" because he knew something of these things; Merz gave us "a song of the once-open road" because many of the people on it do not know, but it is not their fault. It is not their fault partly because there are so few places where they can come into real contact with nature without violating trespass laws and partly because it is not easy for those who catch but glimpses of nature in their busy lives to learn the really interesting features of the great, complex out-of-doors.

Teachers about nature have a great responsibility and, if plenty of the right kind of public parks are provided, these teachers will have great opportunities. There will be places for both "blue jays" and "blue jeans" and the two will enjoy themselves and each other. Conservation will not need so much preaching, because more will practise it, knowing what it is all about. Far from being destroyers of nature or even ignorers, automobilists as a class will be protectors of nature because they are not ignorant. After all, they are human beings even though they do not ride in our car; and, if they are

A SNOW MAT OF APLINE FIR ON OLD FAITHFUL NATURE TRAIL, YELLOWSTONE NATIONAL PARK

THE BOTANY POST ON OLD FAITHFUL NATURE TRAIL, YELLOWSTONE NATIONAL PARK
Strings lead from the names on the post alongside the Trail to flowers in bloom

ignorant of nature and of how to treat it, that is because no one has taught them and there are few chances for them to teach themselves.

We can still sing the song of the open road if our eyes are open and if there are places where we can use our eyes; but trespass notices, however inconvenient, should be respected. Let us, the public, have many conveniently located bits of nature that belong to us. Let us, nature-lovers, see to it that there is an abundance of out-door museums in which the exhibits are natural because they are nature and in which these exhibits are so labeled that the public, of which we are really a part, may understand and be interested.

The American Museum's Station for the Study of Insects tried an experiment along this line three summers ago and the success of the experiment far exceeded even our expectations. We told people about nature when these people were out-of-doors where they could see living specimens in natural environments. I do not mean personally conducted field trips. On them, one who knows can benefit, at most, only fifteen or twenty people at one time. We label our museum exhibition halls so that visitors do not need a guide. Why not follow the same method where Nature provides the exhibits? The newspapers described our "Nature Trails" in the Harriman State Park, near Tuxedo, New York, as an "insect zoo" and that was a rather fitting name for one section of the trails. On the other hand, it told only a part of the truth, for we believe that, to understand and thoroughly appreciate the lives that insects live, you must not only see live insects but you must know about their environment, about the plants upon which they feed, and about the animals that feed upon them; you must sense the light, the shade, the moisture, and the temperature that go to make up the habitat of the insect. So, at the Station for the Study of Insects, where we made our first Nature Trails, we told our visitors about the plants, for example, and, if the visitor was interested in plants, we had something for him even though he was not interested in insects.

We told about these things partly by word-of-mouth but largely by labels, and we tried to make these labels as human as every-day conversation.

There were two Nature Trails, each about half a mile long and roughly circular. One was called the "Training Trail" and the other the "Testing Trail." Information was given on the Training Trail, but on the Testing Trail there were fifty numbered questions about the plants and the insects along its sides. If a visitor wished to "test" himself he could write his answers to these questions, bring them to us, and we would tell him his score, or he could score himself by use of the list of answers posted at the end of the "Testing Trail." Also, we had competitions both between individuals and between teams.

Instead of risking confusion by attempting to tell something about everything that grew along the Training Trail (and, for the most part, we included only those things that naturally grew there) we picked out just a few of the easy and most interesting things, especially things concerning which there is popular misinformation. Also, we largely avoided technicalities. For example, it is a technical matter to distinguish the various oaks of the black-oak group and even the specialists do not agree. So we merely said

that members of the black-oak group can be recognized as belonging to that group by their having a tiny bristle at the end of each principal lobe of a leaf, while members of the white-oak group have no such bristles. We told that the acorns of the black-oak group are not palatable, while those of the white-oak group are more or less so; that many insects recognize the difference between these groups and feed only on the leaves of one or the other; and so on.

We tried to teach some underlying principles of conservation by showing that, if a flower is picked, the plant's children (its seeds) are killed; that, given a chance, a small tree would grow to become a large one; and that plants, the chestnut for example, suffer from diseases just as we do. (American chestnuts have been killed by a fungous disease and not by insects.) We asked people to benefit themselves and others by not needlessly stepping on or breaking a living plant. This they did in a mighty fine way and, as a result, although thousands tramped our Training Trail, it is at no place where it really was a trail (and not a road) more than eighteen inches wide. Only a few not-yet-knowing people—possibly hopelessly ignorant or selfish—picked the flowers that others wished to see or dropped paper where it would mar the beauty of God's out-of-doors, which it is our right to enjoy unspoiled.

The underlying idea of our labels, the "spirit of the Training Trail," was that "a friend is taking a walk with you and pointing out interesting things." This friend, the label we put there, when showing the winding tunnel inside a leaf where a tiny caterpillar spent its life feeding and growing, quoted Lowell:

> There's never a blade nor leaf too mean
> To be some happy creature's palace.

and, as the visitor walked by the side of the babbling Wild Cat Brook, one of these friendly labels reminded of Stevenson's

> There's no music like a little river's. It plays the same tune (and that's the favourite) over and over again, and yet does not weary of it like men fiddlers. It takes the mind out of doors; and, though we should be grateful for good houses, there is, after all, no house like God's out-of-doors. And lastly, sir, it quiets a man down like saying his prayers.

We put these Trails where we did so that they might be convenient of access to the automobiling public, but especially that they would be relatively near the many organization (scouting, charity, and industrial) camps in the Interstate Park. Do you realize that thousands of children from cities and towns are camped there, each for a week or more, every summer? It is not enough to lecture about nature to these children during the winter when they are seated as though in school and with nothing to look at but pictures. A fine city museum, no matter how realistically its exhibits imitate nature, does not fully meet their needs. We cannot help them much by writing magazine articles and books. The children are in the Park every summer with nature all about them. It is the time and the place to tell them what they are keen to know.

The better of these camps have "nature councillors" and exceedingly useful camp museums, the latter preferably made by the children themselves. The Nature Trail is an additional help. Some have called it an "outdoor museum" but it is not that, for a museum is a place to which specimens are brought and in which they are stored. The nature-trail idea is to leave things where they are but to label them with interesting facts. If interesting facts are given first, less interest-

ing ones will then be more readily grasped. Is that not true in your own case? After you have learned that a toad catches insects for food, that its young are tadpoles living in water, and that, though warty itself, it does not give warts to people who touch it, you will probably care to know that the scientific name of toads is *Bufo*, that the species you are looking at is *Bufo americana* and that it differs from another native toad, *Bufo fowleri*, in such and such characters. At any rate, on our Training Trail the labeling was not a catalogue of species but a personal conversation.

If there is but one Nature Trail in a large region, something is gained, since it is possible for people to come from a distance to see it; but that is not "taking nature lore to the public"; it is asking people to come to nature lore. So, it was extremely gratifying to see with what enthusiasm various camps took up the idea and made Nature Trails of their own. The children, in doing this work, learned more than they could possibly do by merely studying a trail that some one else had made. Furthermore, they had a sense of proprietorship; that trail was theirs; they had become part owners of nature and their fathers and mothers and all their relatives and all their other friends were welcome to come and share in the joy of knowing about out-of-doors. Thus our half-mile of Training Trail grew in a season to more than ten miles and this fact, even more than the kind verbal comments of our visitors, made us think that our work was worth while. Now there are hundreds of such Trails and on three continents.

Why not? Why should there not be written or printed "friends" in every city, county, state, and national park telling people something concerning the things there—not just the names of them but something that appeals? Why should not the camping grounds of automobile tourists be made more than mere overnight stopping places? If a commercial concern thinks it is worth while to put its slogan where you cannot help but see it while you eat your wayside lunch, why is it not the duty of those who know about nature to meet you there and by neat, chatty labels tell you something worth while? That would be taking nature lore to you and to others of that vast company of people we call "the public," and it would be well worth while.

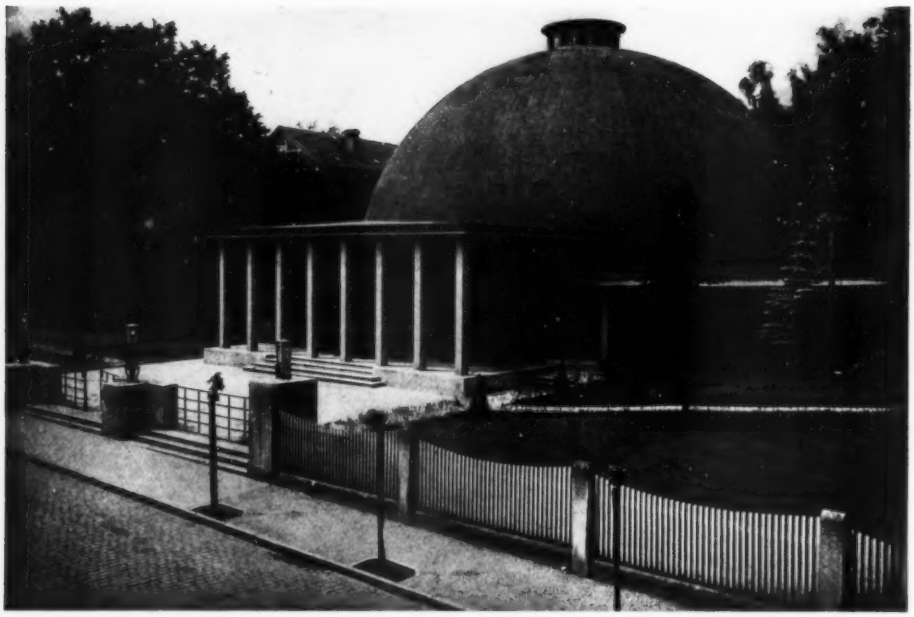
The New Projection Planetarium

By W. J. LUYTEN
of the Harvard College Observatory

WITH its plans for installing one of the Zeiss projection planetariums in its proposed Astronomical Hall, the American Museum of Natural History has again taken the lead in bringing before the American public one of the most amazing triumphs of science and engineering, and in offering them something of great educational value. This "Miracle of Jena," as Professor Strömgren, director of the Copenhagen Observatory, aptly called the planetarium, at once a school, a theater, and a moving picture, presents to the interested public not only the whole great field of astronomy, but the whole conception of the universe as revealed by many centuries of painstaking labor and study of the astronomers, and it does this in simple, comprehensive form, in the silent language of the stars themselves.

A planetarium is, by its name, an instrument which shows the motion of the planets and their satellites around the sun, and portrays the mechanism of the solar system. Ever since the time of Copernicus, or rather, since the acquiescence of the authority of the Church (which first burned Giordano Bruno at the stake and made Galileo recant his heresy) planetariums have been constructed to show how the planets revolve around the sun, and the moons around their respective planets, thus explaining the phases of the moon, and of Venus and Mercury. Huygens, in Holland, was known to have made one of the first relatively accurate machines. Charles Boyle, nephew of the famous physicist, the fourth Earl of Orrery, had a very complicated planetarium constructed for him, which has since been named for him, thus giving rise to the word "orrery," now often used to describe a planetarium. One of the most celebrated planetariums of recent times is that of Eyse Eyzinga, in Franeker, Holland. But undoubtedly the most elaborate and most successful of them all is the great Zeiss planetarium at Munich, which is in a room with black walls in which are many very small holes, indicating the stars. Although this instrument was the best in existence, it was universally agreed that it was not satisfactory, because it portrayed the solar system as an observer on the outside would see it. So the Carl Zeiss Corporation set to work to design an apparatus which would show the universe as we really see it, from the *inside*, avoiding the difficulty of having to imagine ourselves on the outside of the universe. And this was no easy task, as you can well imagine. It took Dr. Ing. W. Bauersfeld, the inventor of the present planetarium, twelve years of calculation and experimentation, and five years of construction before he could produce the first projection planetarium.

Let us consider what such an instrument must do: It must show the sky in exactly the same flattened form as we actually see it; it must give this sky the same dark-blue color, and above all it must convey to us the impression that it is infinitely far off. The several thousand stars which the human eye

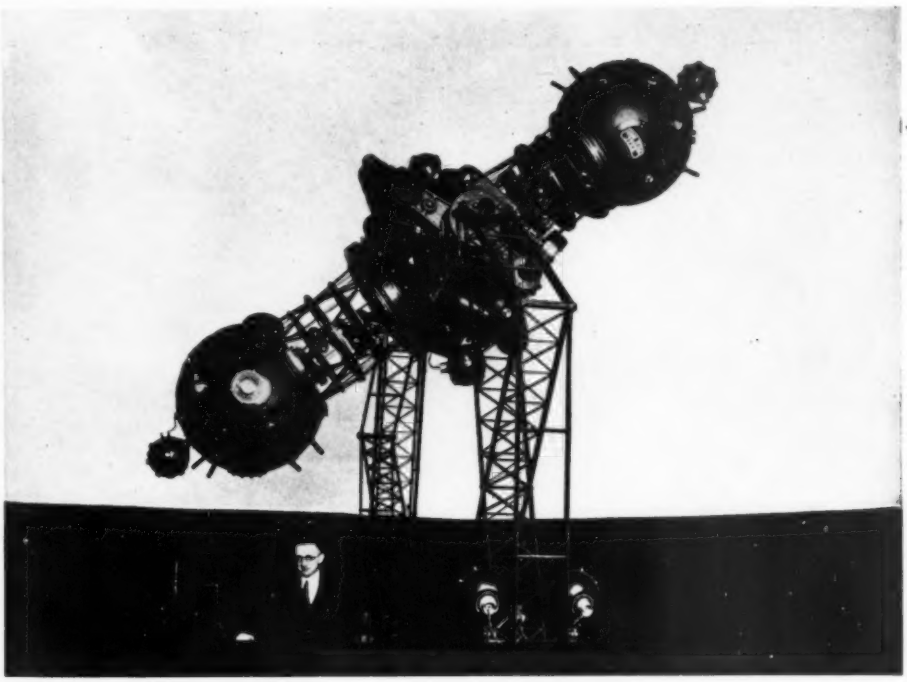


The Zeiss Planetarium in Prinzessinnen Garten in the old university town of Jena

can see must be depicted with truthful accuracy; they must be shown to rise and set in the same manner as we observe them to do. The sun, moon, and planets must be shown moving along the celestial sphere in their appointed places; they must show the same phases and the same changes in brightness as they do in the sky. But when the new instrument was ready for action, it *did* fulfill all these requirements, in fact, it far surpassed expectations, even those of the inventor,—its success was immediate and great. The original instrument, made for the National Museum in Munich had a hemispherical dome about thirty feet in diameter, but subsequent domes were quickly increased in size, until at present they are built seventy-five feet or more in diameter. The one in Düsseldorf has a diameter of ninety feet.

In the center of this enormous dome stands the projection apparatus, containing in embryo the whole visible universe. It consists of a large glass cylinder carrying a large knob at each end. These knobs contain a replica of the actual sky, the stars, planets, Milky Way and other objects of interest. The glass cylinder represents the power behind the throne, it is the brain of the universe, it directs the destiny of the firmament, and decides whether we shall see the sky as it is now or as it was in the remote past or as it will be in the distant future. Each of these knobs has several lenses on its surface, 39 in all; behind these are lantern slides carrying the stars on them. By lighting a powerful electric lamp in the center of each spherical arrangement of projectors, behind these lantern slides, the stars, tiny little holes in the black film of the lantern slides, seem to emit light, and by means of the lenses images of them are projected on the dome. The new projection apparatus contains about 5400 such stars, and the greatest care

has been taken that no slight defects in the lantern slides should give rise to "new" stars,—spurious objects which do not actually exist in the sky. The size of the star images on the original slides is such that the artificial sky shows the stars in the exact proportion of their brightness. For this reason Sirius, the Dog Star, has been given a special projector, in order that it may, as in reality, appear as the brightest star in the firmament. In addition to the projectors for the stars there are seventeen lenses which are made to show the well-known star clusters and nebulæ, such as the Pleiades, the Beehive cluster, and the great nebula in Orion. Two projectors, one on each knob produce the Milky Way in the sky, giving an almost exact replica of this faint, hazy, band which extends all across the sky. Thirty-two other projectors can, if so desired, be lit, in order to show the names of the constellations. In the glass cylinders between the knobs are housed the projection apparatus which produce the sun, the moon with all its phases, Mercury, Venus, Mars, Jupiter, and Saturn, while at various places, not used otherwise, minor refinements are located.



The Zeiss Projection Planetarium, the great invention which is installed in the center of the dome at Jena

Such are the complicated technical details of the Zeiss projection planetarium; but when the machine is in operation these details become lost, and the spectators see only the realistic and thrilling spectacle of the infinite and eternally moving universe. When first the visitors to the planetarium enter the dome and take their seats as near the center as possible, they see

STUDENTS READY FOR A DEMONSTRATION AT THE ZEISS PLANETARIUM IN JENA

nothing but a brightly illuminated white surface, the inside of the dome. Gradually the lights are dimmed, and, as the eyes become more and more accustomed to darkness, the now perfectly dark sky seems to take on that peculiar dark-blue hue which our eyes see in the real night sky. Then suddenly, the artificial sky is lit, and the whole audience whether trained astronomers who know what to expect, or school children eagerly awaiting the unexpected, cannot suppress an involuntary exclamation of delight, and for a few moments they sit spellbound, fascinated by the twinkling multitudes of stars. They feel as though they had been transplanted to a high mountain-top, and, gazing at the lucid beauty of a clear night unspoiled by disturbing moonlight, suddenly realize their insignificance in the infinity of surrounding space. Then the machinery is set in motion, and the firmament begins to turn, stars rise and set, and the spectators cannot help but feel the silent music of the spheres. The Milky Way appears in all its splendor, and some sensitive eyes already see some of the larger spiral nebulæ, and other far distant objects. Again the picture changes at a command of the operator of the projection apparatus, who, for the time being has become the Directing Power of the Universe. The sun, moon, and planets appear, the rotation of the earth carries them across the sky,—and a day passes in four and a half minutes. By a change of gear even this can be speeded up, and a day be made to pass in less than one minute, a year in five minutes, a century in a few hours. But again the universe is tampered with,—the clock is put back several thousand years, and the sky is shown as it was seen by the early Chinese observers, by Ptolemy, by Copernicus, and by Galileo. It is even possible to produce the conjunction of bright planets which formed the star of Bethlehem, and it is shown how, in the course of 26,000 years, the North Pole of the heavens changes place among the stars, deserting our present Pole Star, approaching Vega in 12,000 years, and returning again to its point of departure in a "great year," 26,000 ordinary years. By means of special devices, a comet may be made to appear, and eclipses of the sun and moon be made to occur.

In short, so great is the spell which a demonstration of the planetarium casts over the spectator, that he cannot help feeling the lure of astronomy, he cannot help realizing that he has for a moment, at least, peered into the mysteries of the infinite. It is this lure of astronomy, inherent in all human beings, which has made possible the erection through private endowment of so many first-class observatories in this country, and which in turn is satisfied by opening the principal observatories to the public as often as work permits. But, as all astronomers know, only too often do interested people have to be turned way, simply because the sky will not oblige. With a cloudy sky, an observatory can do nothing. The planetarium does not mind such a little thing as a cloudy sky. It can be operated at any time, under any weather conditions and it will never disappoint its visitors. Furthermore it will never be necessary to resort to such desperate means as cutting an image of Saturn with its rings out of cardboard, affixing it to a distant wall, and turning the telescope on it in order that a royal visitor may not be disappointed by cloudy weather, as once happened in an English observatory.

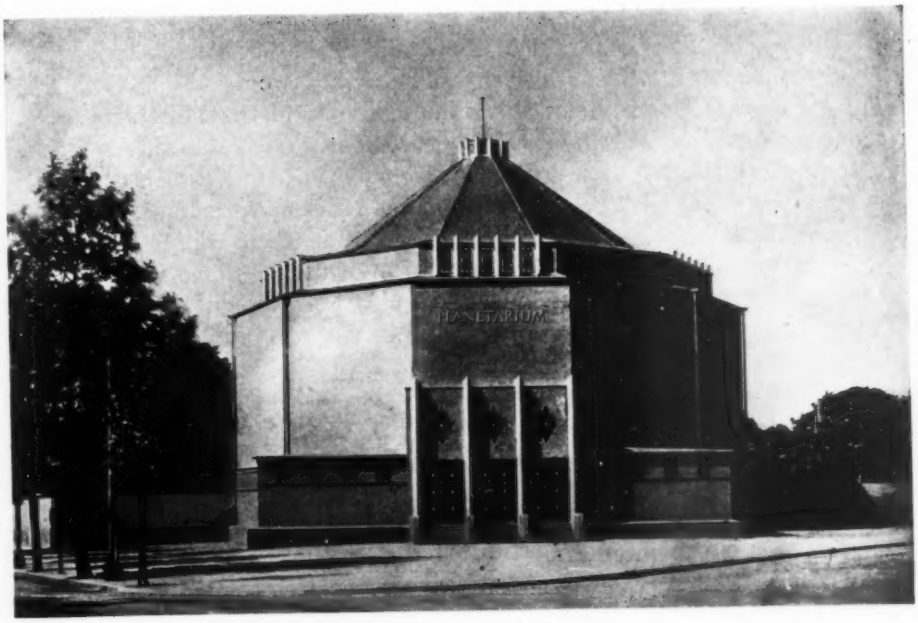
For educational purposes, as well, a

STUDENTS READY FOR A DEMONSTRATION AT THE ZEISS PLANETARIUM IN JENA

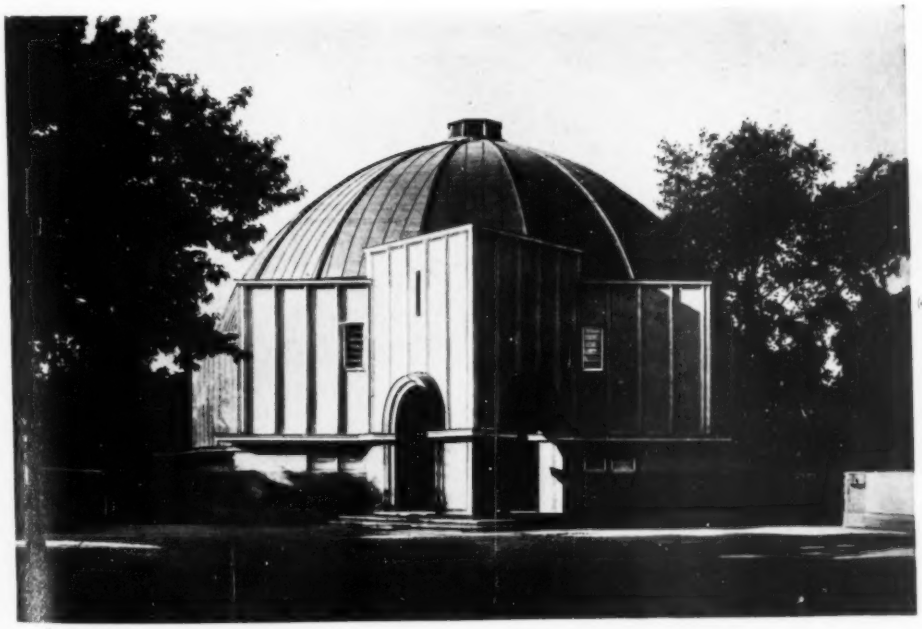
In Düsseldorf,—the largest planetarium dome yet constructed

In the capital city,—Berlin

VARIOUS TYPES OF DOMES FOR THE ZEISS PLA



In the great railroad center,—Leipzig



In the art center,—Dresden

IN USE IN GERMANY
PLANETARIUM

projection planetarium is invaluable. In a few hours more can be shown with it and more attained in the way of explaining difficulties, than could be done by several months of lecturing. It is not surprising, therefore, to hear that more than a score of cities in Europe have already obtained one or ordered one. Munich, in Bavaria, was the first, but Jena, Düsseldorf, Berlin, Hamburg, Dresden, and many other cities in Germany soon followed. And the great success may be measured by the fact that, in less than two years, the planetarium in Munich attracted more than 80,000 visitors.

In this country the American Museum of Natural History took the lead very early when Dr. Clyde Fisher, director of the astronomical department of the Museum, went to Germany to study the construction of the planetarium with the express view of having it adopted by the American Museum. Doctor Fisher, in announcing the campaign for financing the new astronomy building, said that he expected the new planetarium would probably attract more people to the Museum than all other features combined. The new Astronomical Hall which has been planned for the Museum, and which is to cost $3,000,000, will be a five-story building with the dome for the planetarium as the crown of the building. The plans have been fully drawn, but construction has been postponed pending the completion of the endowment drive.

Other American cities seem to have been more successful in their plans for the erection of a planetarium. In Chicago the project has definitely been started with the offer of Julius Rosenwald to finance it, in Seattle Louis C. Frye, millionaire packer, has already opened negotiations with the Zeiss company. And of course the rivals of the Pacific Coast—San Francisco and Los Angeles—are both looking forward to a speedy erection of a planetarium.

An Opportunity

THE interest in astronomy is surely increasing, and a hopeful sign it is. A generation or two ago the subject was included in the curriculum of many secondary schools as well as of colleges and universities, but it was gradually dropped, without much doubt, on account of the feeling that even an elementary knowledge of the subject involved too much difficult mathematics. In the last few years, however, either in spite of the mathematical bugbear or because some of the technical part has been eliminated from astronomy as a cultural subject, the pendulum seems to be swinging the other way. One of the outstanding bits of evidence that there is a genuine and widespread interest in the subject is shown in the organization this spring of a popular astronomical society in New York City. Several of the leading newspapers gave favorable editorial notice of the organization meeting, and the movement was encouraged and helped by the scientific magazines. As a result Prof. Henry Fairfield Osborn welcomed 500 people to the first meeting which was held at the American Museum, and within six weeks the new society could boast of more than 600 members,—probably already the largest astronomical society in the world. Its official name is

"The Amateur Astronomers Association," and the American Museum of Natural History is its headquarters.

The members of this new society, as well as thousands of people throughout the country, are intensely interested in the plans of the American Museum of Natural History to build an astronomical hall,—this structure to be the central part of the series of buildings of that institution as outlined in the Astronomical Number (July–August, 1926) of NATURAL HISTORY. It is most fitting and proper that the astronomical department, which shall set forth the most ancient, the fundamental science, should occupy the hub of this great natural history museum.

A Museum of Astronomy equipped with exhibits, with interesting and lucid labels, and with apparatus that will work before the visitors' eyes, the climax of the latter being a Zeiss Projection Planetarium, will have an irresistible appeal to the public. Every one loves the beauty of and is interested in the movements of the heavenly bodies, and desires to know about the origin of our planet and of our solar system.

What field of science offers so great an opportunity to enjoy majestic beauty? What subject helps us more in our natural struggle to comprehend the infinite? What science does most to lift one out of the petty things of everyday life, thus allowing the soul to expand?

Consequently, what greater educational project can be conceived than building and installing the proposed astronomical hall at the American Museum of Natural History? At present, the greatest thing of the kind is in Munich. What an opportunity for some great philanthropist to establish in our metropolis an institution whose educational and inspirational effect upon the people of America would be immeasurable!

—CLYDE FISHER.

NOTES

SCHOOL SERVICE

EDUCATIONAL FILMS FROM LAPLAND.—Mr. George D. Pratt, a Trustee of the American Museum and chairman of its committee on education, visited Sweden and Norway this summer where he took both still and motion pictures of the country and its people. These are to be used in the Museum's work with public schools. Mr. Pratt also procured from the Swedish Film Industry a copy of the film "In the Country of the Mountain People." This film, which tells the story of summer and winter life in Lapland, was especially taken for the schools of Sweden.

COPPER MINING IN MOTION PICTURES.—Through the interest of Mr. George D. Pratt, the motion picture library of the school service department has been enriched by the gift from the Kennecott Copper Corporation, 120 Broadway, New York City, of ten reels of motion pictures on "The Story of Copper." This film shows different methods of mining copper in the United States and Alaska, as well as the processes of milling, smelting, and refining. These pictures are for the use of the public schools of New York City, and will be shown in the Museum auditorium.

THE CONSOLIDATED GAS COMPANY OF NEW YORK has deposited at the American Museum four reels of motion-picture film showing the history and manufacture of illuminating gas and the uses of gas in modern industry and in the home. These films are for free distribution to the public schools of New York City.

THE DEPARTMENT OF PLANT AND STRUCTURES has also deposited with the Museum a three-reel film which shows the work of various city departments from the Board of Alderman in session to street cleaning. These films are especially adaptable for civics classes and will be lent free of charge to any public schools in New York City.

MR. ERNEST THOMPSON SETON conducted

an expedition through several of the western states for the purpose of studying sign-language, dances, and other customs among the Indians. Other members of the party were Dr. and Mrs. Clyde Fisher and Mr. Herman A Sievers of the American Museum; Mr. George M. Will, archæologist, and Mr. Clell Gannon, artist, of Bismarck; Mr. Russell Reid, naturalist of the North Dakota State Museum; Mr. Carol Stryker, curator of the Staten Island Museum; Mrs. Julia M. Buttree, secretary of the expedition; and Miss Helen E. Saunders, biologist, Girl's Commercial High School, Brooklyn, New York.

Doctor Fisher, with his Akeley camera, secured some excellent motion pictures of sign-talking, with translation, among the Sioux on the Standing Rock Reservation at Fort Yates, North Dakota, and of a number of dances at Taos, Santa Clara, Tesuque, and other pueblos in New Mexico. He also made several hundred still photographs of various places of interest in the west, including some of the Petrified Forests, the Painted Desert, and the Grand Cañon in Arizona.

CANADA IN MOTION PICTURES.—Following a visit to the Candian Government Motion Picture Bureau, Mrs. Grace Fisher Ramsey secured twelve films portraying the industries and scenic features of Canada. These are for distribution to schools, churches, or civic organizations in New York City and vicinity.

MOTION FILMS OF LIFE IN MEDITERRANEAN PORTS.—Mr. Philip Pratt, who with Mr. John Foley visited Mediterranean ports this summer to obtain motion pictures for the Museum, has recently returned. He reports that as a result of three months' study of the countries bordering the eastern end of the Mediterranean Sea, he was able to secure a series of pictures in Syria, Palestine, and the delta of the Nile. These three new films of scenes from the every-day activities of the people add new interest to the growing collection of travel pictures at the American Museum.

In Egypt Mr. Pratt concentrated on the delta country and included many scenes of rural and town life, as well as the life of Cairo and the port of Alexandria. In Palestine the towns of Jaffa, Haifa, Jerusalem, Bethlehem, Nablis, and Nazareth, as well as others less known, were visited, and a pictorial record of the mode of life in that country was made. Another phase of eastern life was studied in Damascus and Beyrouth, and other Syrian towns. Special attention was given to child-life in these countries, and many of the pictures show them at work and play. In addition to the motion pictures, Mr. Pratt took several thousand still photographs.

Mr. Pratt received every possible assistance for the execution of his work through the generous coöperation of the American Export Steamship Company.

A FEW NOTABLE BOOKS ON NATURE EDUCATION AND THE MUSEUM

Through Field and Woodland. By Alice Rich Northrop. Edited by Oliver Perry Medsger. G. P. Putnam's Sons, 1925. As indicated by the title, this book is a companion for nature students, and it covers nearly all phases of natural history. Written by the founder of the School Nature League, it was left unfinished at her untimely death. To finish the work, and to arrange the material, no better person could have been engaged than Mr. Medsger, the thorough-going and dependable all-round naturalist and teacher of experience. The editor is head of the natural science department in Lincoln High School, Jersey City, N. J. Containing more than 500 pages and 200 illustrations, a goodly number of the latter being plates in color, the book is all it purports to be,—a veritable *vade mecum* for students of nature.

First Lessons in Nature Study. By Edith M. Patch. Macmillan, 1926. Not many technical scientists preserve the point of view of childhood and youth, but the author of this book is an outstanding exception for whom we are grateful. Miss Patch is the only woman who holds the position of State Entomologist in America, and she is also a member of the teaching staff of the University of Maine. Her earlier books, *Dame Bug and Her Babies*, *Hexapod Stories*, and others have shown that she can write interesting untechnical stories that are accurate as natural history. This work is dedicated to the dean of nature study teachers in America, Anna Botsford Comstock, and is worthy of such inscription. It is a book of nearly 300 pages, divided into 15 chapters. and will be found most helpful to both pupils and teachers.

Nature Guiding. By William Gould Vinal. Comstock Publishing Co., 1926. Doctor Vinal was formerly professor of nature study in the Rhode Island College of Educa-

tion; he is now a member of the staff of New York State College of Forestry. This book of about 700 pages was prepared for that great American institution, the Camp. The author is finely equipped both by experience and training for the undertaking, and he has brought together a wealth of material of great value to the camper and to the nature counsellor.

Nature-Study, Part 1. By Charles Lincoln Edwards. Hesperian Press, Los Angeles, 1924. Doctor Edwards has been director of nature-study of the Los Angeles City Schools for more than a dozen years. Previous to his present work, he was a university professor for twenty years. He believes that any one who desires knowledge of nature should have all that the university offers, but stripped of the technical terms which so often conceal, rather than reveal, the truth. Here is a book of more than 200 pages, containing chapters on "Spirit of Nature-Study," "Sense Education," "Plants and Animals of the Home Neighborhood," "Mammals of the Circus," "Seaside Life," etc., which is especially adapted to the Pacific coast and our western country.

Manual for Small Museums. By Laurence Vail Coleman. G. P. Putnam's Sons, 1927. This book was written for those who contemplate founding a museum, or for those who wish to stimulate the growth of small museums already in existence. The author says that he was prompted to write it by his "observation of the rapid growth of interest in museum-making and the hindrance or defeat of many efforts through lack of information."

Much of the material was gathered by the author in the course of travels over 15,000 miles from the northern to the southern border of the country and from coast to coast, since he has been Executive Secretary of the American Association of Museums. Without doubt Mr. Coleman has visited more American museums than any one before. That he has really investigated them and interpreted their work is abundantly shown by the content of the chapters.

The book contains 400 pages and is illustrated with 32 plates. Every phase of museum activity and every branch of museum administration are treated. In the introduction the museum field and the purpose of museums are discussed. The first part of the main book is devoted to organization, the second to administration, the third to curatorial work, the fourth to educational work, the fifth to research, the sixth to building, and the conclusion to the outlook, and then follow a number of important appendices.

No one is so well equipped to write a book of this nature, and we believe it will be found indispensable to those for whom it was prepared.—C. F.

ASTRONOMY

THE UNUSUAL GROUP OF LARGE SUNSPOTS visible most plainly September 15 to 17 was the principal subject of discussion before the large audience that convened at the American Museum of Natural History on the occasion of the first autumn meeting of the Amateur Astronomers Association. Mr. Harry Lawton, one of the members, showed a lantern slide of a superb photograph, made on the day of the meeting, by Mr. William Henry, of a tremendous group of spots, the three largest of which averaged 28,000 miles in diameter. The whole group covered an area of about 160,000 miles long by 85,000 miles wide. Mr. Lawton discussed the correlation of sunspots with auroral displays and their possible relation with the meteorology of the earth.

Dr. Clyde Fisher, president, invited the members to visit the Museum on Friday, September 16, and Saturday, September 17, to view these spots through the Brashear telescope. Many persons responded to the invitation. The sky was free of clouds on both days, and the spots showed with startling clearness.

ASTRONOMY FOR GIRL SCOUT LEADERS.—Dr. Clyde Fisher gave an astronomy lecture in the Girl Scouts National Training course for leaders at Camp Macy, near Briarcliff Manor, New York, on September 22. Two hundred and sixty-four Girl Scout leaders from all parts of the United States were present. Doctor Fisher's lecture was on the subject of the evening sky, and was prefaced by a description of the Zeiss Projection Planetarium and the Astronomical plans of the American Museum.

TESTIMONIAL OF ESTEEM TO HENRY FAIRFIELD OSBORN

In celebration of the seventieth birthday of Henry Fairfield Osborn, August 8, 1927, his many friends and coworkers from all parts of the world united in a testimonial of affection and esteem by presenting to him a unique and

QUEEN ANNE SILVER-GILT CUP AND COVER

Made by Thomas Folkenham in 1711

This cup was presented to Prof. Henry Fairfield Osborn by his friends as a token of affection and esteem, on the occasion of his seventieth birthday, August 8, 1927. The cup is mounted on an ebony plinth with silver-gilt inscription plate by Freeman of London

beautiful cup and a set of engrossed resolutions. The cup, of Queen Anne silver, was made by Thomas Folkenham in 1711. The resolutions bore more than 500 signatures inscribed on individual cards of vellum, which were assembled and mounted with the greeting in an illuminated gift book, designed and executed by William E. Belanske.

Because of Professor Osborn's proposed trip to the west and absence from the city on August 8, the presentation was made at his home in Garrison on July 28 by a subcommittee. At the same time Professor and Mrs. Osborn were invited to be the guests of honor at a reception to be held September 29, when the surplus of the funds raised by Professor Osborn's friends—amounting to more than $7,000—will be presented to Professor Osborn for his research work. All arrangements for this celebration are in the hands of a committee of which Dr. Frank M. Chapman is chairman and Dr. William K. Gregory is secretary.

The birthday resolution follows:

TO HENRY FAIRFIELD OSBORN

August 8, 1927

On your seventieth birthday your colleagues and friends join to salute you, to congratulate you and to express their delight in finding you radiant in health and spirit, joyously carrying on your life work.

We desire to thank you most heartily for your leadership in many fields. Drawing around you in the American Museum of Natural History a staff of explorers and coworkers who are animated by your spirit and who gladly enroll under your banner, you have penetrated to the uttermost parts of the earth and have brought its natural history treasures to the Museum. To your unceasing labors, as Curator of Palæontology and as President, we owe the series of unique exhibition halls at the Museum, where countless visitors pass before an impressive panorama of extinct life. Thanks to your sympathetic understanding, the school-children of New York and their teachers enjoy all the educational and emancipative opportunities of the Museum's School Service. And in the near future the Museum will also display still other imposing evidences of your constructive genius when the Roosevelt Memorial Hall and the Akeley African Hall take their places in the assemblage of buildings devoted to science and education.

We desire also to express our admiration of the creative, tireless spirit which, during a life crowded with administrative work, has produced a series of publications, covering many hundreds of titles and ranging from brief articles in NATURAL HISTORY to the great monographs on the titanotheres and the proboscideans, now in press.

We congratulate you upon the many distinguished honors that the highest scientific tribunals of the world have awarded to you in recognition of your services to science. We join the great company of your readers in acknowledging our indebtedness for such classic works as "From the Greeks to Darwin," "The Origin and Evolution of Life," "The Age of Mammals," and "Men of the Old Stone Age."

Princeton University will not forget your services when in 1877 as co-leader with your life-long friend Professor W. B. Scott, you led the first Princeton expedition to the fossil fields of Wyoming; or when, after your return from your graduate studies at Cambridge University, you brought the Huxleyan gospel of comparative anatomy to your pupils.

Columbia University has reason to remember the great part you played in planning and guiding the Department of Zoology in its formative period; nor will your old students, either of Princeton or of Columbia, ever forget what new worlds you opened to them and showed them how to enter.

The New York Zoological Society owes to you thirty-one years of brilliant service as Chairman of the Executive Committee and later as its President.

From many parts of the world therefore your friends unite to testify their appreciation of your services as a leader in biological science, in education, and in the highest ideals of citizenship.

We congratulate you again upon this unique record of service. We delight in the admirable spirit of fairness, generosity, friendliness, and comradeship which you have shown, not only to your colleagues but to the least of your assistants. And we rejoice with your devoted wife and your sons, daughters and many grandchildren, that this seventieth birthday finds you with forces unimpaired, still planning, still building, under the inspiration of a dauntless optimism.

CENTRAL ASIATIC EXPEDITIONS

At the second "Asia Lecture" of the Royal Geographical Society, November 8, 1926, Dr. Roy Chapman Andrews presented a most

comprehensive story of the five years' work done in Mongolia by the Central Asiatic Expeditions. He spoke upon the organization, methods of work, and the most important results achieved in the several branches of science represented. His lecture was illustrated with an excellent series of colored photographs which were secured on these expeditions. After summing up the work of the expedition, Doctor Andrews said,

The three season's field work already completed have been confined to Outer Mongolia, north of the Altai Mountains. We feel that *for the purposes of the expedition*, this region is now sufficiently well known to warrant directing our attention elsewhere. A surveyed line more than 1000 miles long has been run north-west through the heart of the desert, thus giving accurate starting-points for any future topographic work.

We hope in the seasons of 1927, 1928, and 1929 to carry on similar investigations in Inner Mongolia. We are particularly anxious to complete another westward surveyed route south of the Altai which will connect with the excellent work done by Carruthers, Stein, and other explorers in Chinese Turkestan. To carry out such a survey will be one of the main objects of the expedition in 1927. We have reason to believe that rich sedimentary fossil-bearing basins lie in the Western Gobi, and that special attention to prehistoric archæology will be eminently worth while.

Doctor Andrews' talk was prefaced by a short address by Dr. D. G. Hogarth, president of the Society, in which he said,

Doctor Andrews is going to tell us to-night about a great deal more than dinosaur eggs: about the organization of almost a new form of exploration—the realization of what I ventured in my presidential address a few months ago to hope would be the work in the future of this Society—that is, intensive study of a particular area. . . . The great journeys of exploration are probably done in almost all the world, the great pioneer lines have been thrown across the continents. What we have to do now is to fill up great gaps between those single lines. Dr. Roy Chapman Andrews is going to show you how this has been done in a most interesting region, Mongolia.

A discussion, opened by Sir Francis Younghusband, followed Doctor Andrews' report. Sir Francis, speaking of the slides said,

We are too accustomed in this Society to have placed on the screen dreadful dull grey photographs, but Dr. Andrews has brought us colored pictures which have given us a most delightful impression of the desert.

He further remarked:

I should like to add that an expedition such as that described cannot be carried out unless the leader has great organizing capacity. He has, first of all, to spend a year or two in organizing the whole expedition. That in itself is an enormous undertaking: getting the men and money together, as well as the whole of the supplies. And then one can realize what it must have been in the field to coordinate motor cars and camels. When I crossed the desert motor cars had not been thought of. To get Americans, British, Mongols, Chinese, and Heaven knows who else to work together requires in the leader magnificent capacity for organization. And what the lecturer said is perfectly true. Every leader feels that he cannot carry out what he has to do without the men working under him—that he is indebted to them for a great part of the success of the expedition. But success is not due to them entirely. In the main, the success of the expedition must depend upon the leader himself. We can gather from what the lecturer has said and from the way in which he spoke of his men that he is an ideal leader of an expedition.

Prof. D. M. S. Watson, professor of zoölogy, University College, expressed the opinion that

The expedition Doctor Andrews has designed and conducted is without parallel in the history of palæontological science. In the course of three or four years he has brought our knowledge of the history of life in Mongolia from literally and absolutely nothing, except one rhinoceros tooth, to a stage which in the United States of America, which is parallel in size and complexity, was reached only after thirty or forty years of investigation, not by a single authority but by many museums and by the Survey. I do not think anywhere there is any other piece of geological work carried out on the scale of a whole continent, as it were, which has given us at once the history of a large area throughout the whole of Jurassic, Cretaceous, and Tertiary times. Not only have we now this geological knowledge, but we have also revealed to us new and most important types of animals, particularly those little mammals recently described by Drs. Gregory and Simpson, which came from the same beds as the dinosaur eggs, which will, I am sure, prove to be of the utmost importance.

Apart from such finds of interesting creatures, we have the fact that there has been verification of many—not of all—of the conclusions which President Osborn drew from his studies of the distribution of mammals of the world. We have verification of the idea that Mongolia was one of the great centres, if not the greatest of all centres, of the evolution of mammals, and that gives great satisfaction to those actually working on palæontological material. To have one's convictions verified is the test of the value of one's type of scientific work. For that we have to thank Dr. Andrews. We have also to thank him for providing us with a perfect model of the way in which such palæontological expeditions should be worked. We have had investigations carried out in the field by those men who will work out the results in the laboratory, and this for all the sciences which are capable of throwing light on the problems to whose solution the expedition has been directed.

Sir Sidney F. Harmer, director of the British Natural History Museum, congratulated Doctor Andrews warmly on the work he has accomplished. Among other things he said,

Dr. Andrews has already explained that in going to Mongolia he was actuated by the desire to find out what is true and not to prove any theory. That is the real spirit which actuates science in general, at any rate any which is worthy of the name. We have followed with the greatest admiration the work that Dr. Andrews has done. You will agree, from what he has told you, that he has thoroughly deserved success. . . . I should like on behalf of all representatives, as far as I am entitled to speak for them, of geological and allied sciences in this country, to express our cordial congratulations to Dr. Andrews for the great work that he has done and to emphasize the fact that the work really is great. The American expedition has discovered an enormous amount which we did not know before.

HAZARDS OF EXPEDITION WORK IN MONGOLIA.—One of the achievements to which the leader of the Central Asiatic Expeditions may point with pride is the fact that during the first six years of the exploration not a single member of the party met with a serious accident. This party has included, besides the many Chinese and Mongol servants and assistants, a total of twenty foreigners, and the exploration accomplished covered three full seasons in Mongolia with six, eight, and fourteen foreign members on successive years, also many trips to remote parts of China by smaller parties, and all this in regions where opportunity for trouble is not wanting. This freedom from injury or harm has been due partly to the ability of the experienced field

men to take care of themselves under various conditions, and partly to the splendid organization and direction of the expedition by Doctor Andrews.

It was not to be expected, however, that this immunity could continue indefinitely, and this spring the first serious accident happened to Mr. J. MacK. Young, chief of motor transport, who is just now recovering from the effects of severe frost bite.

In March, of this year, when Mongolia was still in its vicious wintry mood, Mr. Young, who at that time had charge of the expedition affairs in Peking, found it important to visit the expedition camel herd which was wintering on the plateau near the motor station of Chap Ser about one hundred miles out from Kalgan. The climate of Mongolia is delightful for two or three months in the summer, and is tolerable in the late spring and early autumn, but for the remaining months of the year it is downright bad, bitterly cold, windy and altogether inhospitable and dangerous. Mr. Young, however, with characteristic devotion to duty and contempt for physical discomfort, started out from Kalgan in a motor car in company with one Chinese assistant. The weather was moderate for the season and he reached the little group of mud huts called Chap Ser without incident. Here he was told by the local Mongols that the camel herd had been recently moved a considerable distance to the northward to new feeding grounds; they also informed him that a snow storm was brewing and that after such storms motor cars were usually unable to travel for several days because of snow drifts. So he reluctantly abandoned the idea of seeing the caravan leader and on the following morning started on the return journey to Kalgan.

A few hours after leaving Chap Ser the predicted storm broke, with blinding snow and a great drop in temperature. The men were warmly clad after the fashion of winter travelers across the Gobi, and no great discomfort was experienced, but upon arrival at the nearest station, some thirty-five miles from Kalgan and still on the plateau, Mr. Young discovered that several fingers of both hands had been frozen, presumably because of pressure on the driving wheel. But it was not until he reached Kalgan the next afternoon, following an all-day fight through snow drifts down the pass, that he realized the seriousness of the situation. He then took the first train for Peking and placed himself under the care of Dr. Harold Loucks, of the Rockefeller School and former Expedition Surgeon. The third, fourth, and fifth digits of each hand were found to be badly affected and it was advised by some to make immediate amputation because of the dread of gangrene, but skillful treatment given by Dr. Loucks over a period of three months has left Mr. Young with all but the tips of three fingers. Recent letters, both in longhand and typewritten, received at the Museum indicate that "Mack" is getting back toward normal again, and both his colleagues on the expedition and his host of friends in Peking and elsewhere are glad to know that the accident has been so much less serious than feared at first.

BIRDS

THE WHITNEY SOUTH SEA EXPEDITION.—A large shipment of material from the Whitney South Sea Expedition has been received at the Museum. It proves to be one of the most important that has ever come from the Pacific. The collection is chiefly from the Solomon Islands, but has a small proportion from the New Hebrides. It comprises several thousand bird skins, many nests and eggs, bird skeletons, and birds preserved in formalin, a small series of mammals and reptiles, twelve Melanesian skulls and other human skeletal material, two hundred Lepidoptera (chiefly butterflies) and a considerable collection of insects of other orders, spiders, myriapods, mollusks, and other marine invertebrates, a box of photographic negatives not yet counted but evidently numbering several hundred, about four hundred feet of motion-picture film, together with field notes and journals which carry the record of the expedition up to date.

The birds number so many rarities that it would be impracticable to list them here. Previously, however, the Museum possessed only a few scattered specimens from the Solomon group, whereas now perhaps ninety per cent of the avifauna is well represented in the collection. Notable among the sea birds is a series of the petrel *Pterodroma brevipes*, not previously in the Museum collection. The land birds likewise include many peculiar and interesting forms which are quite new to the Museum. For the first time there are examples of families which show the affinity of the region with New Guinea and the neighboring large islands. These include hornbills, giant cuckoos, crested pigeons, cockatoos, a

variety of parrots and lories, megapodes, and many others. The expedition is now working in an extraordinarily rich region, and altogether this collection of birds is the most diversified that has yet been received.

The Whitney Expedition material continues to add indirectly as well as directly to our natural history collections. Through exchange of Polynesian specimens obtained during the early years of the expedition, the museum has accumulated many species of rare birds from other parts of the world, and has greatly reduced the number of genera lacking in the world series.

CONSERVATION

CALIFORNIA TO HAVE A STATES PARK PROGRAM.—Good news comes from California to the effect that a bill has been passed by the Legislature and approved by Governor Young, making possible a real States Park Program for California. A central State Park Commission, a State Park Survey, and submission to California voters in 1928 of a $6,000,000 bond issue—to be matched with an equal amount from private gifts—are among the accomplishments which the League has been endeavoring to bring about. Senate Bill 439 unifies the administration of all parks, sites of historical interest, etc., owned by the state of California. A Division of Parks is created under the new Department of Natural Resources. The chief of this division will have the guidance of an unsalaried State Park Commission appointed by the Governor, with an appropriation of $25,000. Senate Bill 440 provides for a comprehensive survey of the state as the basis for developing a well balanced State Park System, with an appropriation of $15,000. Senate Bill 441 provides for submission to the voters in November, 1928, of a $6,000,000 bond issue, the proceeds of which are to be used to pay one-half the cost of park lands recommended by the State Park Commission, the balance of the cost to be contributed from other sources.

HISTORY OF THE EARTH

THE DEPARTMENT OF VERTEBRATE PALÆONTOLOGY has suffered an irreparable loss in the resignation of its head, Dr. W. D. Matthew, who left in June to take up the post of professor of palæontology in the University of California at Berkeley. Doctor Matthew first came to the American Museum on July 1, 1895, as an assistant in the department of vertebrate palæontology. Later he occupied the positions of assistant and associate curator, and was made full curator in 1911. In recent years he has been curator-in-chief of Division I, which includes, besides Vertebrate Palæontology, the sciences of Mineralogy, Geology, Geography, Astronomy, and Invertebrate Palæontology.

Doctor Matthew's connection with the department, thirty-two years, covers almost the entire period of growth and development of the department, which was established by the Trustees, under the curatorship of Prof. H. F. Osborn, late in 1890. During this time the collection of vertebrate fossils has grown under Professor Osborn's direction to the greatest in existence.

In the accumulation of this collection, in its preparation, in its public exhibition, and in the scientific and popular reports upon it, Doctor Matthew's share of the work has been monumental. Doctor Matthew's long and intimate association with this collection, and the opportunity he has had of studying other collections in many parts of the world, coupled with thorough training and a natural ability, have resulted in a knowledge on his part of the fossil vertebrate faunas of the world which is probably unequalled. His leaving is therefore not only a distinct loss to his own department and to the Museum in general, but to the whole scientific community of New York. Fortunately, it has been arranged that Doctor Matthew return to the Museum for two months each summer in order to complete the several important studies which he has had in hand for some time, and it is hoped that departmental volumes will bear his name for many years to come.

HONORS

CARL AKELEY HONORED.—At a General Assembly of the Société pour la Protection de Nature held at Brussels July 9, 1927, Dr. Jean Derschied, who had just returned from the Kivu, gave an interesting account of his voyage to central Africa in company with Carl Akeley. After Doctor Derschied's address, Mr. Edmond Leplae, president of the Society, spoke of the life and achievements of Mr. Akeley, and expressed the sentiments of universal regret aroused by his untimely loss. Upon a motion made by Mr. Leplae, Mr. Akeley was unanimously elected, posthumously, Membre d'Honneur of the Society as a mark of appreciation of his eminent and distinguished services to science and to the work of conservation.

MAMMALS

FRICK EXPEDITION TO QUEBEC.—Through the generosity of Mr. Childs Frick it was possible for Mr. George Goodwin to spend two months this summer, in the southern part of Quebec, collecting mammals for study groups in the American Museum of Natural History. The trip, which extended up the Cascapedia River as far as Berry Mountain, was made by automobile, team, and canoe. Of the 350 mammals collected, the most noteworthy specimens were a series of ten Gaspé shrew, *Sorex gaspensis*, and nine specimens of Rock vole, *Microtus chrotorrhinus*.

THE LEE GARNETT DAY RORAIMA EXPEDITION.—Recent communications from the Lee Garnett Day Roraima Expedition in the field report favorable progress. A week-end cable from Manaos, Brazil, to Mr. Day stated that the party was sailing on August 24 up the Rio Branco with Boa Vista as its destination. Boa Vista is in communication with Manaos by wireless, but after the expedition leaves Boa Vista it will be out of touch with the outer world, and the Museum is not likely to have any word from it until the party emerges from the Roraima district, some months later. A small collection of birds and mammals from Para has already been received at the Museum.

HUNTING ALASKA BROWN BEARS.—Mr. Van Campen Heilner plans to hunt the Alaskan brown bear at Pavlof Bay, which is the type locality for *Ursus gyas*. Any specimens of this bear obtained will be carefully prepared, with full measurements and skeletons, in the hope that they may serve as the basis for a future group of Alaskan brown bears. Mr. Heilner, although field representative in the department of fishes, has very broad interests in various branches of science, and has actively participated in other expeditions, one of which was to Ecuador for birds, with Dr. Robert C. Murphy.

MR. FRANCIS B. SHIELDS of the department of mammals is spending his vacation along the north shore of the St. Lawrence, where he expects to make a collection of mammals for the Museum. Incidentally, Mr. Shields, who is a student of archery, will attempt to collect the large mammals with bow and arrow.

MARINE LIFE

Dr. Roy Waldo Miner has returned from a trip to Mount Desert Island, Maine, where, through the coöperation of the Mount Desert Island Biological Laboratory, he obtained final observations for the new Rotifer Group and a number of careful studies of marine annulates to be utilized in constructing a series of models for the Darwin Hall. Doctor Miner was accompanied by Mr. Frank J. Myers, research associate in Rotifera, who coöperated in the work for the Rotifer Group and also continued his researches on the Rotifera of North America. Dr. George H. Childs assited Doctor Miner in marine work and executed a fine series of drawings in color for the annulate models.

Doctor Miner also gave a lecture in the laboratory course on "Studying a Coral Reef from the Bottom of the Sea."

REPTILES AND AMPHIBIANS

DOCTOR NOBLE spent the summer months at the Marine Biological Laboratory, Woods Hole, in the capacity of Investigator. There he continued his studies on the anatomy and evolution of the Amphibia. He has recently been appointed National Counselor in Reptile Study of the Boy Scouts of America.

A PAMPHLET ON THE REPTILES AND AMPHIBIANS OF THE NEW YORK CITY REGION written by Doctor Noble, has just been published in the Guide Leaflet series of the Museum. The pamphlet, gives a list of the species found in the local region together with a summary of their distribution. Many New Jersey reptiles and amphibians are not found on Long Island, and others are absent from Westchester County. The list was prepared to call attention to these differences and to indicate the gaps in our knowledge of the ranges. It should be of special value to the local naturalist.

IN THE NEW LABORATORIES of the department of herpetology facilities are available for the study of living specimens. Reptiles and amphibians may easily be shipped alive, for they do not require food en route. During the past three months, a collection of living frogs has been received from Australia, some living geckos and lacertid lizards from Spain, and several shipments of reptiles from Central America. Of special interest is a pair of basilisks—lizards that run over the surface of water—from Honduras. Shortly after arriving in the Museum, the female laid a number of eggs which are developing well in a nest of damp wood pulp.

MR. CLIFFORD POPE during June and July visited the mountains of western North Carolina and eastern Kentucky to complete

his studies of the salamanders of that region. This was Mr. Pope's second expedition, and the fourth sent by the American Museum, to investigate the amphibian and reptilian faunas of these mountains.

Mr. Pope directed his efforts to solving three problems; first, the tracing of the life history of the rare arboreal salamander, *Aneides aeneus;* second, determining the course of evolution among the terrestrial salamanders of the genus *Plethodon;* third, investigating the status of a rare yellow-cheeked species of *Desmognathus.* It was found that these plethodons, though restricted to narrow ranges, were very abundant within certain limited areas. The coral-cheeked *Plethodon jordanii* is confined to the topmost ridges of the Great Smoky Mountains, by far the highest range in the East. *Plethodon shermani*, still more narrowly confined, has been found only on the top of Wayah Bald, a mountain in the short Nantahala Range. It is characterized by the coral color of its legs which contrasts sharply with the uniformly black body and head. Study of the yellow-cheeked *Desmognathus* showed that its position as a distinct species is not convincing. Because of their dependence upon the cool, moist atmosphere of the higher mountains, these salamanders cannot cross the deeper valleys, and are therefore unable to extend their narrow ranges. They have evolved "on the spot." *Aneides aeneus* was found, in eastern Kentucky, to live under the loose, decaying bark of dead trees, both fallen and standing. A cluster of eggs was discovered, the first on record.

In addition to solving these definite problems, Mr. Pope secured several hundred living specimens, many of which will serve as material for experimental research through the coming winter. Among the species secured alive are *Plethodon shermani, P. jordani,* and *P. metcalfi; Desmognathus phoca, D. quadramaculatus,* and *D. fuscus fuscus; Leurognathus marmorata* and *Aneides æneus.*

Through the kindness and interest of Mrs. Ethel De Long Zande and her colleagues of the Pine Mountain Settlement School, Harlan County, Kentucky, living quarters were provided for Mr. Pope during his research work in these mountains.

SCIENCE OF MAN

THE BERNHEIMER EXPEDITION.—Early in the summer Mr. Charles L. Bernheimer organized and led the Sixth Bernheimer Expedition to the Navajo Mountain district in southern Utah. Mr. Bernheimer reports the achievement of the objectives laid down for this season's work which were, in the main, to gather information on and locate sites of archæological interest, to search for traces of animals of the Jurassic period, and to find a natural bridge of which reports had been heard. The expedition was eminently successful in every respect. Hundreds of prehistoric dwelling sites were seen and noted for possible future examination, though in every case preliminary search was made for potsherds and burial sites (Sansoni Mesa). At Hogoha Labyrinth, inaccessible cliff-house sites were seen and also a burial cist. The fall of a huge bowlder which narrowly missed one of the guides and covered up the burial cist, prevented careful examination. Here also was discovered the most interesting ruin seen this summer, a cave containing mud- and grass-walled but roofless houses built in pairs. These showed no signs of habitation, but the ground in front of the cave was strewn with potsherds of many types.

During the expedition of 1926 there were noted numerous dinosaur tracks. These were re-visited for further study. Casts were taken of some of these tracks for future study in the Museum.

Through his volume on *Rainbow Bridge* Mr. Bernheimer's lively interest in natural phenomena of this kind is well known, and this latest expedition led to the discovery in Monument Valley of another arch of the Rainbow Bridge type. This bridge was named Clara Natural Bridge. It forms the head of a box cañon and is wedged about 200 feet above its base; it is 100 feet high, 175 feet from base to base, 25 feet thick, and 25 feet wide on top.

ETHNOLOGICAL COLLECTION FROM DUTCH GUIANA.—Through the generosity of Dr. Morton C. Kahn, of the Cornell University Medical School, who has recently returned from an expedition to Dutch Guiana, the department of anthropology has received an ethnological collection from the Djukas or Bush Negroes living on the Saramacca and Surinam rivers. The Djukas are descendants of African Negro slaves imported to northern South America during the period when the slave trade with the west coast of Africa flourished. Despite the passage of time and their contacts with the Indians of the region, these Bush Negroes still retain, both in physical type and in general culture, many of

their African characteristics. The collection donated by Doctor Kahn consists of ceremonial objects, amulets, rattles, clothing, etc., and of implements of every day use, such as carved gourds, and seats, food paddles, pot stirrers, spoons, combs, food and clothing pounders, all carved out of wood. It is in these carved wooden objects that the resemblance to African techniques, both in form and ornamentation, is very marked.

DR. MARGARET MEAD spent two months this summer visiting German museums. The object of her trip was two-fold: to familiarize herself with innovations in the exhibition of Oceanic ethnological specimens, and to make a detailed study of the Melanesian and Micronesian collections in Germany. The American Museum has a large and rather heterogeneous collection of Oceanic specimens, many of which were collected by whalers and came into the Museum without accurate localization. No American museum possesses Melanesian collections equal to the German collections made during the extensive German colonization in the Pacific. The present careful exhibition in German museums of this bulk of material provides the best background for the localization of specimens in other collections.

Doctor Mead visited the museums in Bremen, Hamburg, Berlin, Dresden, Cologne, Frankfort a M., Stuttgart, Nuremberg, and Munich.

This trip will serve as a basis for the further classification of our Oceanic material and the ultimate rearrangement of the South Seas Hall.

THE DISTINGUISHED JAPANESE ARCHÆOLOGIST, DR. K. HAMADA of the Imperial University of Kyoto, Japan, visited the Museum recently to study archæological material from America. Doctor Hamada spent part of the summer with Dr. A. V. Kidder, observing field methods in the archæology of the Southwest. Later he visited the Ohio Mound area where he was the guest of the State Archæological Society. The early archæology of Japan is now an object of special interest, and Doctor Hamada expects to begin systematic field exploration upon his return.

MR. J. REID MOIR PRESENTS FLINT IMPLEMENTS TO THE AMERICAN MUSEUM.—Through the efforts of President Henry Fairfield Osborn, the Museum recently acquired from Mr. J. Reid Moir of Ipswich, England, a series of thirty casts representing the finest of the supposed flint implements found mostly by himself in the Pliocene and Middle Glacial deposits of East Anglia. The specimens have been placed on exhibit in the Tertiary Mammal Hall. With the exhibit of the ancient material has also been placed a series of modern flint pieces demonstrating Mr. Moir's theory of the development of the most characteristic tool, namely, the rostro-carinate or eagle-beak.

NEW BOOKS

Our Face from Fish to Man, a book dealing with the comparative anatomy and early history of the human face, was completed by Doctor Gregory during the summer; also a chapter on "The Lineage of Man" for *Creation by Evolution*, a work including articles by leading authorities edited by Frances Mason.

The Marine Fishes of New York and Southern New England, by J. T. Nichols of the American Museum's department of ichthyology, and C. M. Breder, Jr., of the New York Aquarium, has recently been published by the New York Zoological Society. It is on sale at the Museum as well as at the Aquarium. Herein each of the 261 species known to have occurred in local waters is illustrated by an outline drawing, which should be of service in distinguishing them. There are also paragraphs on distribution, seasonal occurrence, life histories, and habits.

THE BINGHAM OCEANOGRAPHIC EXPEDITIONS.—The first paper contributed from the Bingham Oceanographic Collection has just reached the Museum. This deals with the Ceratioidea or deep-water frog-fishes, and is by Mr. Albert E. Parr. Several new species are described and figured, showing how rich are the collections which Mr. Harry Payne Bingham has recently been obtaining in his yacht "Pawnee" for his private oceanographic museum. This paper is the first of a series of scientific reports on the oceanographic expeditions directed by Mr. Bingham. We are told that two others are already on press and are about to appear.

NEW MEMBERS

SINCE the last issue of NATURAL HISTORY the following persons have been elected members of the American Museum, making the total membership 9753.

Patrons:

Messrs. LEE GARNETT DAY, W. F. KENNY, GUSTAVUS D. POPE, JOHN ALEXANDER POPE.

Fellows

Mrs. KEITH SPALDING.
Mr. HENRY ROGERS BENJAMIN.

Life Members

Mesdames: WM. E. S. GRISWOLD, M. TAYLOR PYNE, JR.

Messrs: ORRIS G. LAWSON, HERBERT PULITZER, D. K. WORCESTER.

Master HERMAN ARMOUR NICHOLS, JR.

Sustaining Members

Mr. BERNARD A. ROSENBERG.

Annual Members

Mesdames: ROBERT J. ALEXANDER, WINIFRED M. BURGESSER, GILBERT DARLINGTON, WINIFRED S. HARRIS, M. M. SEABECK, WALTER SICHEL, ETHEL IRIWN SMALLEY, H. A. VAN DORN, NORMAN WALLACE, JAMES P. WARBURG, PERCY SHELTON WEEKS, TURNBULL WOOD, CLARENCE H. YOUNG.

Mother RYAN

Misses: AMY HOPE BALLARD, CLEMENTINE PLIMPTON GENNERT, FLORENCE HALSEY, ELEANOR HODGES, VIRGINIA M. PENNOYER, DOROTHY WEIR.

Doctors: EDWARD L. PARTRIDGE, WM. A. WILSON.

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THE NATURE NUMBER

SEPTEMBER-OCTOBER

The September–October number of **Natural History** will deal with nature's many phases, from recently discovered fossils of past ages to the latest studies of animal life at home and abroad.

Among the articles will be "Creatures of Perpetual Night" by G. Kingsley Noble, "The Peruvian Guano Islands of Seventy Years Ago" by Robert Cushman Murphy, "The Truant Tides of Tahiti" by H. A. Marmer, "Light and Darkness in a Tropical Forest" by H. C. Raven, "The Coral Seas of Michigan" by E. C. Case, "Frog Hunting in Fukien, China" by Clifford H. Pope, "Desert Landscapes of Northwestern Nevada," by Chester A. Reeds, and a discussion of "Recently Discovered American Pleistocene Artifacts" by Harold Cook, Henry Fairfield Osborn, Albert Thomson, W. D. Matthew, W. K. Gregory, N. C. Nelson, and Barnum Brown.